No 55 — June/July, 1987 $2.75

EARTH GARDEN

Making mudbricks with heavy clay, Australia's rarest eucalypt is discovered, Building a sauna, A biodynamic farm developing, Building a baby's cradle, Making cider the old-fashioned way, A control board for solar electric houses, Weaving a safari helmet, Plant pathology facts, Popular herbs, Cheap houses, Land Lines and more . .

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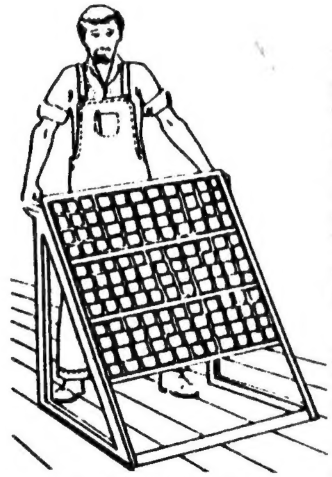
EARTH GARDEN BOOKS



ENERGY WORKS!

Home Energy Systems

By Keith Smith

Nelson, Melbourne, 1985, large format paperback, 211 pages, illustrated. ☐ $19.95 posted.

Why spend the rest of your life paying someone else for your electricity? Here's how to plug in the renewable energy of the sun, wind or water using an efficient 12V or 240V solar electric system, wind generator or water turbine. Run lights, radio, TV, computers, tools and appliances wherever you live.

"The major part of this book is devoted to practical issues, hardware and actual installations.

". . . This book should appeal to anyone wth an interest in the supply of energy to weekenders, farms or other remote dwellings or even to the suburban household." — Dr C. J. L. Cornish of Murdoch University, WA, in *APACE WA Newletter*.

The Settler's Guide

Old time skills and bush lore

Compiled by Keith Smith

Nelson, 1983 (second printing), large format paperback, 176 pages, illustrated. ☐ $15.95 posted.

Pioneer a bush block from 'go' to 'whoa'. How to clear, fence, square a gatepost, whitewash, build a slab hut, a rammed earth house or a timber windpump with hand tools. Harness horses and select, sharpen and care for bush and bench tools like axes, adzes, planes, crosscut saws, mauls and scythes. Tried and true advice from *The Agricultural Gazette* of NSW, 1890-1910.

Third Earth Garden Book

Edited by Keith & Irene Smith.

Nelson, 1981, large format paperback, 256 pages, illustrated. ☐ Special $5.50 posted.

A collection of practical, original, human-scale methods for providing the essentials of life, with stories from New Settlers on farms and communities all around Australia.

The Third EG Book tells you how to build fences, gates, a concrete water tank, plastic greenhouse, Coolgardie safe and compost privy; how to spin and weave, make rugs, dilly bags or baskets; how to build your house from earth, stone or timber; how to raise coloured sheep, freshwater fish or yabbies, or grow permanent tree crops and protein-rich legume crops.

HARD TIMES HANDBOOK

Survive — and thrive!

Keith & Irene Smith

Nelson, 1986, 204 pages, 70 illustrations. ☐ $8.50 posted.

This is the second, corrected edition of our practical book of skills, strategies and short-cuts for urban survival. HARD TIMES HANDBOOK outlines a new, self-reliant approach to city living. It tells you how to do more with less, be prepared for food shortages and emergencies, save energy, make money without a job and manage your food supply. Make bread, yoghurt, soft cheese, candles and soap. There are 150 recipes for cheap, healthy tucker and 180 money-saving household hints.

EARTH GARDEN 55

JUNE/JULY 1987

Front Cover
A cradle can be attractive *and* functional. Our son, Tane (28 mths), slept in his cradle until he was 15 months old and ready for a cot.

Dear readers 2
Earth people write 3-6
The Stickiest Mud of All **by Bob Rich** 7-11
Cider from the days of old **by Sophie Masson** 12-13
Getting the Drum: warning **by Chris Martin** 13
Robin's eucalypt: the discovery of a lifetime **by Robin Jean** 14-15
Some like it hot, and free **by Brian Priest** 16-17
'Doing time', and learning with the owner-builder apprenticeship **by Bill Lowe** 18-19
Build your own sauna **by Thomas** 20-21
A Shack into a Castle **by Sophie Masson** 22-23
Managing plant diseases **by Darren Phillips** 24-28
Battling in the bush **by John Wolfe** 29-31
How to construct a solar electric control board **by Peter van der Wyk** 32-34
Some thoughts on solar retailing **by Greg Baker** 35
Build a baby's cradle **by Alan Thomas** 36
Thyme: for any garden **by Liz Sinnamon** 37
Another bio-dynamic farm is flourishing **by Graham Roberts** 38-40
Weave your own safari helmet **by Jose Robinson** 40-41
Earth Garden Reviews **edited by Sophie Masson** 42-43
Old style cream baking **by Jan South** 44-45
Unclassifieds 45
Landlines 46-47

Founded by Keith & Irene Smith, 1972.

EARTH GARDEN is Australia's original journal of self-sufficiency and alternatives. It is intended as a forum of practical ideas, shared knowledge, sources and to point towards alternatives to unfulfilling consumerist lifestyles.

It's about putting a roof over your head, growing your own food, using alternative energy systems, and surviving — and thriving in the city or the bush, with the inner changes which follow when you're in tune with Nature.

Published and edited by Camille and Alan Thomas.

Book Review Editor: Sophie Masson.

Illustrations by Bronwyn Halls.

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Contributions to EARTH GARDEN are welcome — sharing information and experiences with other readers strengthens the network of Earth Gardeners.

Photos, illustrations and diagrams are important when sending us contributions.

Subscribers are sustainers — for subscription details see page 48.

We welcome advertisements appropriate to the aims and ideals of EARTH GARDEN, but reserve the right to refuse ads at our discretion. Write to us for display rates.

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Dear readers,

Welcome to issue number 55 and we hope you have been pleasantly surprised.

We know you will have noticed that this issue is the biggest since we changed to bi-monthly from quarterly publication. Well, we aim to keep *Earth Garden* at this expanded size. When EG was quarterly we all got to savour around 224 pages a year. When we started the year we hoped that by Christmas we'd be able to get above 240 pages (6 issues X 40). Things have gone so well already, and more than enough people realise that EG is continuing post-Keith and Irene, that we are now 48 pages per issue, or a total of 288 pages a year.

Obviously, that means more work for us, but our home has been alive with that word all year now. With the first issue we published, on top of thousands of subscriptions pouring in from all over the country, we didn't really know what had hit us. With the second issue we actually got a brief glimpse of what had hit us as it steamrolled across the paste up desk, out the door and into the printer's lap.

But now, we feel that maybe we *haven't* really got a few emus loose in the top paddock, and that we really *are* starting to get acclimatised. You'll notice new features slowly starting to creep into EG from now on. It always takes a while for new ideas to catch on, but we have a few stashed away that we're pretty keen on, and we'll bring them out bit by bit.

For example, in this issue we're letting you know that from now on we will print photos to go with LAND LINES. Now that will probably take a while to catch on but we know there are many beautiful properties advertised in EG which could be described better with a photo.

Another new feature starting this month is EARTH GARDEN REVIEWS. We get many letters from people asking for recommendations of books on different subjects and we know that this section will go down well with you. Sophie Masson, EG's new Book Review Editor, is well known to many readers as a regular contributor, and she's enthusiastic about this section.

We are rather embarrassed about something this month. On this page in the last issue we waxed lyrical about being vigilant with mail order operators and chain letters. Well, shuffle-shuffle, there was actually a little classified on this subject in that very same issue. It slipped through the net but we hope no one will get their fingers burnt.

The single-bar radiator has chewed up enough of its 1000 watts while we write this in the freezing cold, so, happy reading.

Yours in peace,

Camille & Alan

And now for a bit of navel gazing

'Social Characteristics of Alternative Lifestyle Participants in Australia' is the mouthful of a title of a book recently published by the Institute of Applied Environmental Research at Griffith University in Queensland.

The book was written by Dr Bill Metcalf and Frank Vanclay, who, many readers will remember, conducted an extensive survey of *Earth Garden* readers a few years back. The book (second edition) is partly based on information collected during that survey and provides many interesting facts and figures.

One aspect which is appealing is the researchers' definition of 'alternative lifestyle'. That's a 'What's the meaning of life?' question and, taking a supremely realistic approach, the researchers have adopted a 'self definition'. That means that if people regard themselves as leading an alternative lifestyle, then they're listed as doing so.

Let me enlighten you with a few interesting statistics from the book (without ruining it for those who wish to buy it*). On the basis of extensive research it is estimated that there are around 60,000 current alternative lifestyle participants in Australia. Approximately 58 percent of 'ALs' live in rural areas, 23 percent are in small towns and 19 percent are in the cities. It is interesting that Queensland has the highest proportion of residents leading alternative lifestyles.

On the education front, those with trade qualifications are well represented throughout the movement and a high proportion of those who responded to surveys held tertiary qualifications. The researchers found an unemployment rate of between 19 and 23 percent for all participants throughout the movement and "perhaps one fifth of the money coming into rural secular communities comes from unemployment benefits. This indicates that unemployment benefits are of much less financial importance than some critics have alleged to be the case".

That's a polite way of saying that next time some ignorant bigot says to you: "Aah, yar'all a bunch of hippie dole bludgers!", you can calmly quote some factual research data.

One of the book's more exciting conclusions is that "an estimated 95,000 Australians express plans to develop an alternative lifestyle, (which) suggests that the movement will continue to grow rapidly". Isn't that great? We can certainly vouch for that last part — every issue there are more and more copies of *Earth Garden* being bought.

*Copies of the book, including postage and handling, are $10 each and are available from the Institute of Applied Environmental Research, Griffith University, Nathan, QLD, 4111.

Earth People Write

Letters to Earth Garden from readers are *always* very welcome.

Dear EG friends,

Here it is June already. The year is racing by so fast. We're sure all of you who are trying to be self-sufficient can understand how little 'spare' time we have in our days. Add to the gardening, animal husbandry, house building and fencing and caring for two ill children, we need 60 hours in a day.

An update on our lives. The children miss so much school because of their chemical allergies that they now do correspondence as a back-up. A great help. They miss about half the year yet are still achieving As and Bs. More importantly they're 'well-behaved' at school (Sure makes a mockery of the doctor who diagnosed Casey as 'mentally ill and a danger to himself and society' when he was four years old, doesn't it?).

We've totally eliminated commercially produced foods from our diet — the only vegies we buy are guaranteed chemical-free. We've stopped storing foods directly in plastic. We freeze in cellophane and glass quite successfully. Also we use old tin ice-cream containers to freeze ice-cream and soups. We're building a rammed-earth house and will use timber floors as we have hassles with cement.

I am relying more and more on recipe books printed before the 1930s — before preservatives.

Lots of farmers are subdividing their blocks here and land is cheap compared to the mainland (100 acres for $25,000 to $30,000).

Quite a few young families are moving in. Lots of *Earth Garden* type folk and we'd like to encourage more.

The isle has great weather, all four seasons, beaches and fishing.

If anyone wants to look at land you're more than welcome to camp on our land. Only stipulation is we must ask for no smoking or perfume, because contact with smellies makes us ill.

We look forward to meeting you all. Love and Peace.

Howard, Marilyn, Casey and Sasheene King. American River, Kangaroo Island, SA, 5221, Phone (0848) 33034.

Dear Earth Garden people,

Can anyone out there please tell me where to get information on *dome building*, either with prefab joiners (where from?) or the geometrical details necessary to make our own. We want to build some pipe frame shade houses for our termite infested heaps. Names of termite resistant trees also would be greatly appreciated.

Gai Early, PO Box 2062, Mt Isa, 4825.

Dear Camille and Alan,

I was wondering is there a poster or large picture of the horse and wagon and travellers on EG 53 for me to purchase please (a way of life we shouldn't forget).

Keith Harding, Morningside, Brisbane, 4170.

Dear Keith,

You might like to write to The Colonial Way, Bridgewater On Loddon, Victoria. They run the horse-drawn caravan holidays and may have a poster you could buy.

—Camille

Dear Earth Garden,

My wife and I have just discovered your wonderful publication. I am retired and my wife will be in about ten years time. We've just bought our dream plot in the Clare Valley of South Australia, and plan a self sufficiency lifestyle similar to your many readers. As you know South Australia is a rather dry area and we would like to see some articles on dry land farming (rainfall about 24" per year).

We wish you well and every success in your new venture.

Trevor and Dee Ware, Clapham, SA, 5062.

Dear Trevor,

It's always good news to hear of people 'making the break' and it's also nice for us to get suggestions for topics readers would like to see in EG. We will look at dry land farming later in the year, although readers in some parts of Australia would not think 24 inches was desperately dry!

—Alan.

Dear Camille, Alan and Tane,

Well, tore open the biodegradable packet to see what you'd done to our bible, and was pleasantly surprised — but we do like a current photograph of you both doing interesting things in the editorial even if it is only washing nappies with home-made soap (forgive me but I preferred the washing machine and Napisan). I boiled as a last resort in the copper to get rid of the chemical smell occasionally. Loved the article on Land Rovers — my husband is a keen Land Rover driver. He has his mother's, which she bought in 1953, as his workhorse. Also loved the article on

cottage gardens. Keep up the good work, we are looking forward to more issues.
Robyn Aisbett, Mundubleera, QLD, 4626.

Dear Robyn,

I don't know if anyone would keep reading Earth Garden if we had our mug shots in all the time. Anyway, at least Tane's managed to elbow his way onto the front cover this issue!

—Alan

Dear Earth Garden,

Having just gone through all the back issues, I find that one subject which isn't covered is patching up and restoring old cast iron stoves. I am about to try reinforced ant bed (red clay high sand content). Wondering if any readers have had experience at patching gaps etc. I wish you every success.
J Hawes, Hamilton Manor, Cooktown, Far North Queensland, 4871.

Dear Camille and Alan,

We are moving finally! We have been working toward this time for the past ten years. I am a high school teacher and have taught in Sydney for ten years. Though I have thoroughly enjoyed this I have been longing to take this step into the fresh air.

I met my wife in Beechworth, Victoria, six years ago. We now have two boys and one on the way. When we move we will be living in a shed, 5 m x 7 m, no electricity, no town water and no bills (except rates).

I will be looking for some casual teaching work around Macksville and Bowraville, if any readers know of any possibilities they can contact me at our new address. All the best for your future success with your new venture.
Paul, Joy, Joshua and Abram Le Cerf, PO Box 78, Bowraville, NSW, 2449.

Dear readers,

I am a hand spinner and natural dyer who is tired of reading the history of spinning, weaving and natural dyeing in America and England. Where are the books on *our* craft heritage? I haven't been able to find any so I am writing the history of spinning, weaving and natural dyeing in Australia.

What I am asking *Earth Garden* readers to do is to let me know what you know about our spinning, weaving and dyeing history. Do some of you know anything that could be helpful? If so please write it down and forward it to me. Maybe your grandmother did spinning for the Forces during the last war, or perhaps you know of a museum that has the information. Whatever — please let me know at the address below.
Jenny Brandis, 26 Forrest St, Quairading, WA, 6383. Ph: (096) 451148.

Dear Earth Garden,

I have recently stumbled across your magazine. I found your first (1-6) copies then a couple from 1984 to 1985 (11 altogether) in a little second-hand shop.

I read all these from cover to cover in two days. I had never heard of *Earth Garden* before so now that I'm living on the land I have found some amazing information to help me along.

Before your books I disliked goats — I thought them to be destructive animals, but now I have second thoughts. Regards.
Karen Robinson, Ravenshoe, North Qld, 4872.

Dear Camille and Alan,

We've sold our hobby farm near Bundaberg and we are in the process of moving house from here onwards to Cairns. Having bought a fridge rubber replacement business, as yet we still have to find a place to run it from.

We are hoping to be self sufficient in every way and not dependant on the government or supermarkets. It is a tall order but we can only try. Regards.
Rowena Mahe, Cairns, North Qld.

Dear Camille and Alan,

No doubt Mr Slau had public safety in mind when, in EG 54, he warned about the explosive dangers of the wetback chimney. But this justification for his interest in it was not matched by his expertise in the area. It should have been obvious from the illustration that even a slight pressure build-up in the system would push the polypipe joiners out of the drum. Also, most people would realise that common garden variety hose clamped to copper tube is unable to contain dangerous high pressures.

Even without expertise, if Mr Slau had read the article properly, he would have noted that "a hole drilled through the screw top lid of the drum acted as a pressure relief" and that "everything held together even when enthusiastic stoking of the fire boiled water in the coil".
John Vukovich, South Grafton, NSW, 2461.

Dear Alan and Camille,

Has anyone any ideas where I can buy house plans at reasonable rates? I have the building inspector breathing down my neck. I'm quite happy living in the caravan and we put in the awful septic tank as ordered by the council, but the boogy man says that I'm not happy living in a caravan and must live in a house. We have lots of red soil which I suspect does not make good mudbricks. It's the same six feet down as it is on top. We found that out when we put the septic tank in. It's alluvial soil, so far I have found no clay. We have lots of rocks too, so I should be able to build some sort of house.

One more thing — if organic growing saves so much on chemicals, how come our local greengrocer charges more for the organic produce than the other type? PS. Any recommended reading on tanning?
Shirley Livesey, Ravenshoe, North Queensland. 4872.

Dear Shirley,

A friend of ours is an excellent architect specialising in low-cost house plans for owner builders in mudbrick, stone or timber. His name is Peter Lees and his address is Lot 39, Woolnoughs Road, Porcupine Ridge, Daylesford, 3461.

Tanning has been covered in EG back in issue 25, which is available from us (see last page). For information on soil suitability for mudbricks, G F Middleton's pioneer-

ing work called 'Build Your House Of Earth' (Second Back Row Press) describes a simple test. Also, Bob Rich's article in this issue is relevant.

In three months time The Earth Garden Building Book, by Bob Rich and Keith Smith, will be published. It looks set to be a landmark publication for anyone interested, or engaging in the love/hate lifestyle of owner building.

As for the organic fruit and vegie prices in your area, the answer is labour, possibly mixed in with a dash of plain old-fashioned profiteering.

—Camille

Dear Camille and Alan,

I just bought issue number 53 as I'd heard of and seen EG for about two years and decided it was about time to investigate. The cover really caught my eye. The romance of it all. Great little magazine. Just this week I picked up number 1 in a local book exchange.

I wondered if you have a binder available to house my now growing collection. I didn't see one advertised or did I miss it? Please advise me. Thank you for a great read.

H Blazeska, Summer Hill, NSW, 2130.

We have been thinking of producing binders for a while now — especially as people regularly write and ask for them. We think we should have some ready before the end of the year.

—Alan.

Dear Earth Gardeners,

We have a turn of the century timber house in Delegate (Victoria). Our nearest town is 30 km away. A young couple were living in it rent free in return for restumping the back section, and rebuilding the bathroom. They had to leave in mid-task. It has a Canberra woodstove, fireplace, with town water, power, and a large backyard for vegies. Are there any handy people needing a year of free accommodation prepared to do these works in earnest?

Ian Ralph, C/- Bonang Post Office, Victoria 3888. Telephone (064) 580266.

Dear Earth Garden,

I have only just discovered your great magazine. I have found it very interesting and informative.

I am 20 years old and about eight months ago I purchased 5 acres of bush at Tyers which is about 20 km from Morwell. I have cleared a small amount of this and have almost finished my first dream. I have been building a small cottage out of bluestone. I have tried to keep it as much early Australian as possible. I have kept a photographic record from start to finish (well I'm nearly finished). Please keep up the good work.

Daryl Koolen, Morwell, Victoria 3840.

Dear Alan and Camille,

I have just enjoyed EG 54, cuddled under the blankets with the two cats, rain drizzling down outside. Loved the piece on Hot Drum — last year we took on this half acre of lovely land in the Blue Mountains, with a very basic dwelling, on long term rental. The coldest winter ever struck us unaccustomed to such cold, and ill-equipped. The previous occupiers bequeathed us, among 50 trailer loads of junk for the tip, 50 44 gallon drums. One is now a 'Hot Drum', at a total cost of about $120, and with some proper lining in the cottage and the kettle steaming on top of the drum, we are not suffering. Thank you for rescuing *Earth Garden.*

Nancy Adam, Leura, NSW, 2780.

Dear Camille and Alan,

I wish you both the best on becoming the editors of EG and success with it.

I have been a reader over the years, more so now than ever before, because I wish to return to the simple pleasures of a low energy, renewable source lifestyle (LERS). I was raised in a similar style when I was a child.

At the moment I'm employed under contract, which has still some years to go, so I'm going to use that time to start an idea I've had for some time now, of setting up a self-reliant village, but with one difference. This village's goal is to seek ways of producing items that are now produced by high energy technologies, and adapt them to LERS technologies.

Briefly, the village would run something like this. The village will contain the artisans with the farmers spread around the village. The artisans will be allowed a set area in which they can erect their dwelling and workshop plus enough free space for some poultry and vegetables.

The artisans' responsibility to the village over their own craft is to help the farmer in periods of high labour-intensive times, for example harvest time. The farmer's responsibility is to ensure there is enough food, such as grain and dairy produce.

The village's responsibility is to ensure that there is ample food for hardships that may occur such as flood and drought, to ensure that no one is homeless, and that it protects its citizens.

It may be like that or perhaps it may not but no one knows till like-minded people get together. I know it is a daunting proposition but it's a challenge. So if any of you *Earth Garden* readers would like to take up the gauntlet and know more, just drop me a line at the address below or drop in if you wish, but let me know first as I have four healthy sons. Peace and serenity be yours.

David Seiver, 106 Regent St, Riverstone, NSW, 2765.

Dear Sir or Madam,

I am the Reference Librarian at Darwin City Library and I am writing to you on behalf of one of our borrowers. They would like to know how to make fish emulsion, which is a liquid fertilizer. I have tried a number of reference books which describe how to use fish in a compost or as a manure, but not on how to make fish emulsion.

I would be pleased it you could inform me if there is an answer to this query. Your co-operation in this matter is appreciated.

Shirley Lavers, Darwin City Council, Civic Centre, Darwin, Northern Territory, 5794.

If any readers can help, please could they forward their replies directly to Shirley, thank you.

—Alan

Dear Green Fingers,
I have surplus quantities of tansy, comfrey, borage, buffalo grass seeds, violets, Jerusalem artichoke tubers, yarrow, lemon grass and the elderberry bush can be pruned for cuttings when it loses its leaves. Can anyone find good homes for them?

I need: underfelt of old hessian backed carpet, flowers for a white garden, plants for a scented garden, leaf crops to plant 4-11 July, fruit crops to plant 26-31 July, root crops to plant 24-31 August and flowering crops to plant late September.

I have always grown sugar bananas here on the south coast, and in recent years have been successful with avocados. After sulking for years my pecan and macadamia trees have produced nuts in 1987. Now I would like to try mangoes, some paw paw and dwarf coconuts.

There is work here over the next two to three years for persons skilled in: permaculture — with an architecture background, and renovation and repairs to a 1930 weatherboard house, cellar, greenhouse, and garden.

I want to buy: a chaff cutter or electric shredder, skillion roof, garden shed, and compost tumbler. For details of the next Illawarra Permaculture Society Sunday afternoon meeting phone (042) 83 3609.
Penny Ferguson, Coalcliff, NSW, 2508.

Dear Earth Garden,
I've read your book Hard Times Handbook and thought it was very good and was quite pleased that there is not much more we can do to save money, as we are both very frugal already!

I wanted to make the floor polish recipe and I cannot obtain 'Carbonate of Potash' anywhere. I've tried everywhere including chemist, hardware and pharmaceutical places in Melbourne. Could you suggest an alternative (would caustic soda do the same?).

Christine Lehmann, 144 Benyon St, Albury, NSW, 2640.

This one's got us stumped. Any suggestions from readers?

Dear Alan and Camille,
An article on Earth Integrated Housing (EIH) in EG 42 outlined the feasibility of people building underground.

These advantages depend on correctly incorporating passive solar principles, correct detailing, a high degree of earth coupling of the building to the soil, adequate insulation and vegetation cover, and appropriate occupant management.

These advantages make EIH a popular method of construction for the following reasons. They are energy efficient, reducing heating/cooling bills by 80 percent, and are comfortable given correct airflow throughout the home. Regular maintenance is largely reduced and there is a lower penetration of outside noise. They provide reduced long term environmental impact, increased security from bushfires, vandals, burglars, cyclones and storms. They can also be used as nuclear fallout shelters.

My interest in EIH is with compiling research material for my final year of Architecture at Deakin Uni, Geelong. So far most of the research material has been from text books, which has left me with a lot of unanswered questions. I am writing to you and any readers with interests in EIH to ask for information to complete my research.

The type of information I am looking for is: occupant responses to their home, builders' comments and any other views and opinions for and against EIH. Comments on daily routines for peak efficiency. Also, technical aspects associated with their designs, detailing, mechanical equipment, materials, specifications, and their overall performances. The internal environment and occupant comfort are also important. Psychological aspects, being unconventional homes, and arguments for and against would inform of their popularity.

Anything else that anyone would like to send me would be appreciated. Looking forward to receiving letters and starting relationships for further correspondence. Addresses of existing EIH would be helpful for future research. Thank you.

Colin Bell, 6 Bell St, Torquay, VIC, 3228.

Dear Camille and Alan,
Thank you both for taking over *Earth Garden.* The pioneering days of Keith and Irene have brought us to a great understanding of a whole life and many practical ways of making life more meaningful, efficient, and environmentally sound. We feel that there is now a big potential for *Earth Garden* lifestyles to be more acceptable throughout the whole community as Australia goes through economic problems and unemployment higher than 25 percent in some places.

We have talked with people of all ages and the general feeling is that growing your own food and making as much as possible, as well as making do with what resources are readily available at hand is a healthy alternative way of living. Also, when necessary, making modern technology a useful tool for *specific* needs.

With these thoughts in mind we have decided to develop our property in these needy times into a Christian community. Our aim is to have a small community of about eight families involved in a wide range of skills from handcrafts and gardening to building and farming.

We think it would be appropriate to build a simple community building also, which could be made available to less privileged groups in the surrounding community.

Our farm is just west of Lismore in lovely Northern NSW. The farm has a north-easterly aspect. 80 acres of the farm are cleared and hilly with tree-lined gullies. It is mostly frost-free and is suited to growing subtropical fruit and nut tree as well as winter vegies. There are another 70 acres lightly timbered with sandstone gullies leading to a waterfall.

We propose that shareholders own their land (up to five acres per family) under a company title. The remainder of the farm would be 'land in common'. Each family's property would be privately owned and privacy would be respected at all times. Each share will cost $10,000 which would include use of a 4WD tractor and farm machinery. We welcome Christians of all denominations to contact us.

Debbie & Dan Bacon, Cawongla Rd, Rock Valley, 2480,ph (066) 293367.

THE STICKIEST MUD OF ALL

Over the years Dr Bob Rich, who lives at Moora Moora Co-operative near Healesville in Victoria, has become one of Australia's authorities on earth building. He is well known to *Earth Garden* readers for sharing his knowledge and advice with us over the years. Later this year *The Earth Garden Building Book*, which he has produced with former EG publisher Keith (Smith), will 'hit the streets'. In the following article Bob outlines general principles of value to past, present and especially future mudbrick builders.

by Bob Rich

Moora Moora Co-operative, via Healesville, Victoria.

Once upon a time I was hired to build a mudbrick hall. Before I started on the job, the organising committee acted on 'expert advice' (from a local builder who had never built in mud) and bought three truckloads of the heaviest, stickiest alluvial clay they could find. According to the 'expert', the local red mountain soil was just no good.

Well, my house is built from red mountain soil very similar to theirs, but the damage had been done. They'd spent money on getting this grey goo there and they weren't going to spend more on carting it away. Besides, they didn't have the knowledge to decide between conflicting opinions.

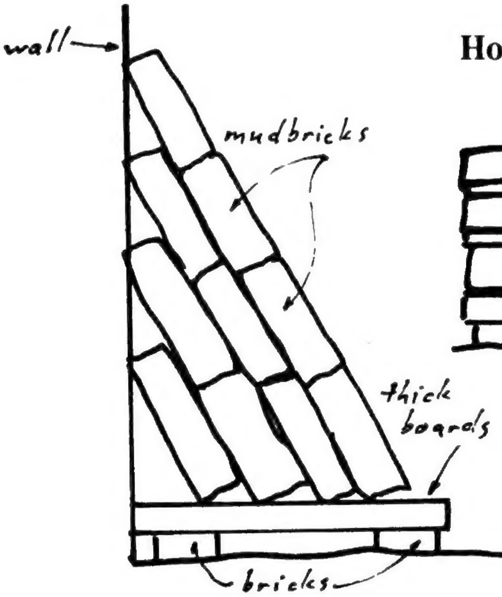
So the hall was built, and very strong it is too, but the job took months longer. Why? Mixing the mud was twice as hard and the bricks took about forever to dry. Matters were not helped by the fact that they had already decided on brick size: big. A large brick has more volume per surface area than a small brick, so it dries more slowly. Also, alluvial clay dries into a very dense lump, so each brick was very heavy. Carrying bricks up onto the scaffolding was good exercise!

My preference is to avoid importing building soil from off site. Why spend money and use irreplaceable fossil fuel when a little bit of experimentation (or past experience) guarantees a method for using *any* soil at all?

This of course goes the other way too. If my building site had been on heavy clay then that's what I would have used. But I would rely on an understanding of the material to make the job faster and easier.

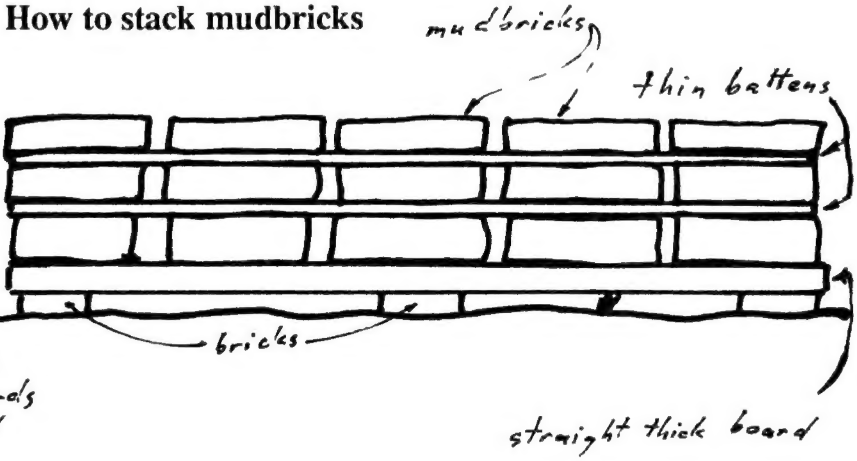
Problems with heavy clay

Heavy clay is highly hygroscopic, that is, it absorbs water. It is also reactive: it changes in volume with moisture content. Once heavy clay is overwetted, it stays too wet almost regardless of the amount of dry material you mix in. On the other hand, any parts that were wet and then dried out will form very hard lumps which are difficult to mix in. The wet mud is sticky — so sticky that if you trample it into a 100 mm (4 inch) high pile it will pull off your gumboots. Shovelling is hard work

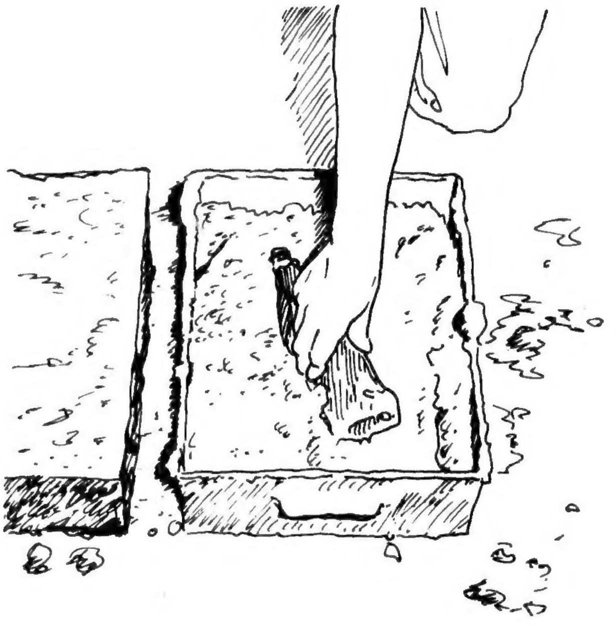


A usual method of storing mudbricks.

How to stack mudbricks



Mudbricks made from heavy clay need to be stacked like this. The stack also needs to be covered.



A bottle in the brick reduces drying time and the brick weight.

because the bottom of the shovel is held into the mud by suction.

Bricks made from most heavy clays are liable to crack during curing, expecially if they are left out in the hot sun, and drying time in winter may be six weeks or more. There will be considerable shrinkage, possibly as much as 20 percent, and it is important to allow for this in calculating the thickness of the wall (brick width).

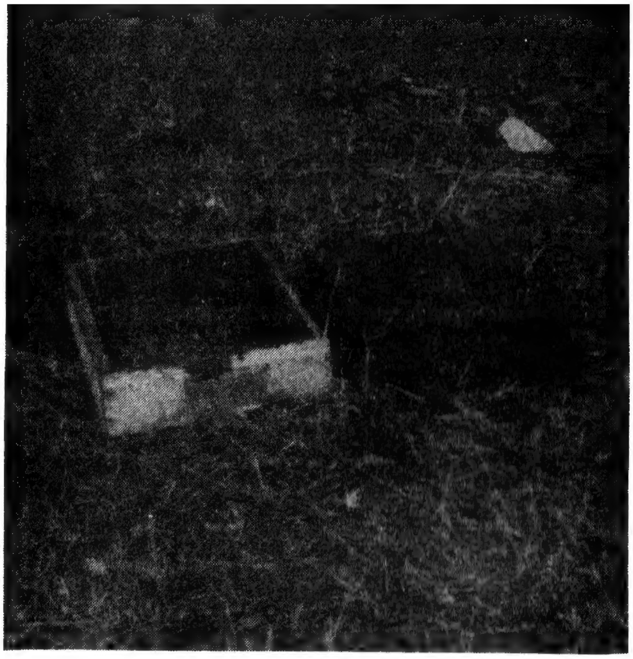
With some clays the bricks stay surprisingly flexible, and will bend in humid weather if stacked as shown in the first illustration. So they have to be stacked flat unless you want to build with mud bananas. The bricks will be heavy for their size, even when completely dry.

There are problems with using heavy clay as mortar. The weight of higher courses can squeeze out mortar lower down, sometimes even weeks after the lower courses were laid. But don't despair: there are tricks of the trade for coping with these problems. Here are a few.

Mixing mud

The best mixing tool for heavy clays is a three or four pronged cultivator, with all the prongs in a line (see illustration), or a nail-toothed rake. Soil is brought in contact with water without being compacted, and the tool pulls out twigs, stones and other rubbish. Move the wet mud around with a digging fork rather than a shovel.

Clay is easiest to mix if it is sifted or pulverised (hard work!) or just slightly damp to start with; when it is bone dry it has hard lumps, and piles of soil left out in the rain can become too wet. So, do one of three things: dig soil out of an embankment as you need it, put up a roof first and have your stockpiles of soil under it, or cover mounds of soil with plastic to keep off the rain and sun.



A 'thin' brick like this dries faster than a 'thicker' type.

With experience you will know how much you'll use up in one session of brickmaking. Wet down this quantity at one time, but preferably in several heaps, each surrounded by a flat area for making bricks (to minimise carrying heavy wet mud).

Time is a much better mixer than labour. At the National Building Technology Centre (it used to be the Experimental Building Station) they wet down a heap of soil, let it stand for 24 hours and then turn it over. If it still has dry parts they add water, let it stand another day and turn it again. This goes on until the heap is homogeneous. Sometimes it takes a week.

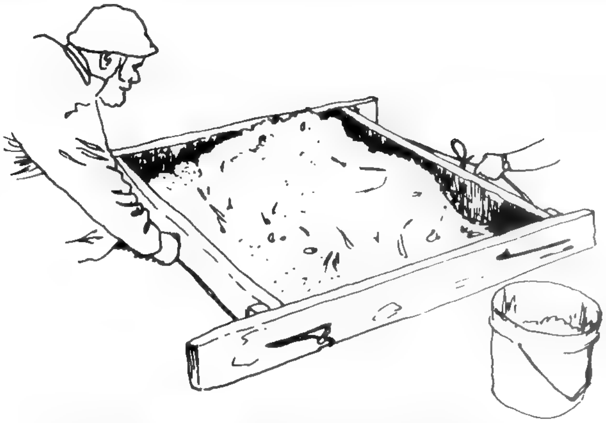
On a production run this implies a batch for each day of necessary soaking. If the soil needs five days to 'cook', you'd start the day's work by making up a new batch, turning and re-wetting the four existing ones, then using up the oldest lot. This is a hard slog, but far less work than using freshly puddled clay. It also takes a lot of space, preferably flat ground under cover. Lack of space is often a major problem with earth building.

Mechanical mixers can be a big help. A brickie's concrete mixer is no good: all you'll get will be a bog lump of clay travelling around, wet on the outside but dry inside. A small rotary hoe or cultivator works much better. Lay out the dry soil in a strip. Run the cultivator over the dry soil until all lumps are broken up. Then water it and run the machine over again until there is a homogeneous sticky goo.

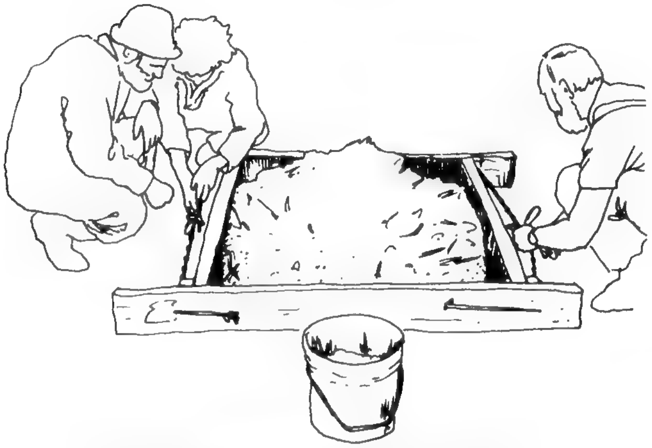
There can be one problem: the machine tends to dig its way through the wet mud down towards the centre of the earth. The Healesville Building Surveyor, Stuart Bowran, told me the solution: run the wheels of the cultivator on a pair of boards.

Bigger machines, such as tractors and graders, are sometimes used on a larger scale, with several people running behind, each frantically filling a mudbrick mould.

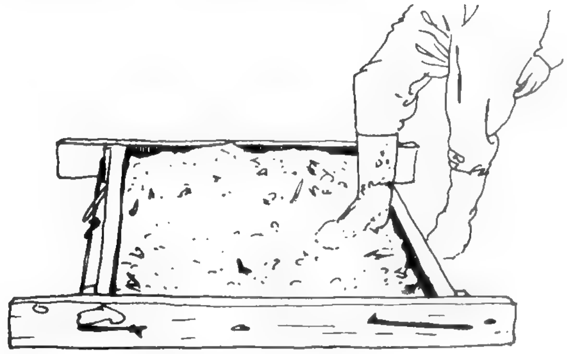
Bob's bonza brickmaker used by students in a mudbrick building course at the Holmesglen College of TAFE in Melbourne.



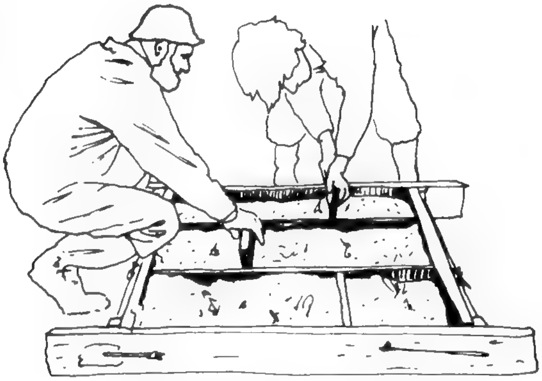
1. Frame is set up around mixed heap of mud.



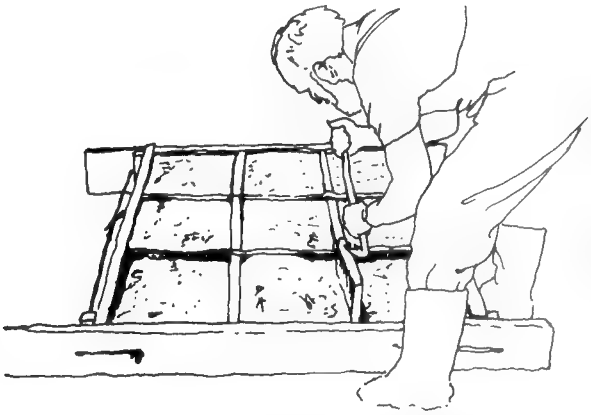
2. String windlassed to clamp up frame.



3. Mud is flattened down to brick thickness.



4. Wooden dividers put in place.



5. Dividers immediately removed.

This is fine *only* if there is strict quality control: dry lumps of soil and other weakening features must be kept out, and the corners of the mould must be properly filled.

I know several people who have mixed an additive into their heavy clay soil to improve its properties. Sand (up to 25 percent) works well. If the local topsoil is impoverished and no good for growing plants it may be better than the subsoil under it for making mudbricks. This is what was done at the 'Mudbrick Monastery' at Stroud in New South Wales (see EG 29).

Micheal Lawrey, a builder from Eltham, Victoria, adds shredded paper to heavy clays and other difficult soils. He soaks paper, then puts the wet clay — up to 25 percent by volume depending on the clay quality — at the same time as straw is added. These bricks are extremely durable, hardly shrink, are fireproof, and as an extra bonus, are very light.

The main problem with making 'cocktails' of clay and additives is the extra work in getting a good even mix. It helps to put alternate shovelsful through a coarse sieve. A mechanical cultivator is a great help. Lay out a one inch layer of sand on a strip of ground, then rotary hoe to a depth of four inches. Put boards down for the wheels, wet the sand-clay mixture, then rotary hoe it again. This produces easy to use, non-shrinking mud.

Making bricks

Bricks made from heavy clay need straw. The traditional recipe is one double handful per wheelbarrowload of dry soil. Some people think of the straw as reinforcement, but rather it is the opposite: a weakener. As the brick cures, the outside dries — and therefore shrinks — faster than the inside. This sets up stresses which can crack the brick apart. Well stirred-in fibrous matter sets up many random points of weakness. This distributes the stresses, so that many tiny blind cracks appear instead of one big fatal one. The result is a brick which is still strong enough and yet stays in one piece.

There is a reason for using straw rather than hay or other fibre. Straw has an enzyme which leaches out and hardens clay.

Straw makes mud mixing more difficult, so add it at the last moment, after the mud is the right consistency. Trample the heap flat, about 100 mm (four inches) thick, then sprinkle the surface with the straw. Don't put too much in any one spot. Heap up the mud again. This mixes the straw in.

Experiment with brick size and shape before going into production. The dry brick should have the wall thickness as its width (double brick walls are much more work). However, length and height can vary. A flat, tile-like brick will dry much faster than a chunky brick.

Some people dislike the look of a house made from 'flat' bricks but you can always cheat with appearance. When laying the bricks, rake out every third horizontal mortar joint, and finish the others flush with the face of the wall. After rendering, the wall will seem to have been made of huge blocks. Unfortunately, flat bricks are more likely to crack. If this is a problem, make the bricks shorter as well.

Another way to reduce drying time is to put an empty bottle inside each brick which is not to be cut at a later stage. This also reduces the amount of mud needed, and the weight of the brick. The brick strength is reduced, but is more than adequate. Half fill the mould with mud and pack the corners as usual. Place the bottle diagonally, work it well in then fill the mould. At least 25 mm (one inch) of mud should surround the bottle. Mark the brick with a B on the top face.

Some people make up a wooden platform for making and drying the bricks. This has an air space under it. The timber slats have 10 mm (one inch) gaps between them. This way, the brick dries from the bottom as well as the top and the sides. Of course, the number of bricks which can be made in a session is reduced to what will fit on the stand.

As a final suggestion, the brickmaker I described in EG 29 can be used to cut the labour of brickmaking to about half. The frame shown in the photographs makes nine bricks, each 400 x 300 x 125 mm (16 x 12 x 5 inches). It so happens that this uses two wheelbarrows (less one shovelful) of loose soil. This much soil is mixed up as usual. After the straw is put in the mud is piled up into a heap. I set up the wooden frame around the heap, flatten down the mud, and put in wooden dividers to cut the mud into bricks.

It is a good idea to line the dividers with sheet metal, and to make them high enough to grab and pull out easily. If straw gets in the way of the dividers, it may be necessary to 'cut' the mud in the right places with a trowel or spade.

Dividers and the frame can be removed immediately, and used on a new heap of soil. The bricks will dry as if individually made. Setting up and dismantling the frame takes a few minutes, and far less effort than shovelling mud for nine bricks. This method can easily be combined with entombing bottles. Of course the soil volume has to be adjusted.

Heavy clay for mortar

It is a mistake to use heavy, reactive clay for mortar with the usual bricklaying technique. Instead, you can use this stuff as a thin slurry (like a pancake mix or continental pea soup). The base you are laying the brick on (the top of the previous course) must have no bumps. Any bits sticking up must be chopped off with a trowel, spade or tomahawk. This should be done to a stringline after the previous course has had plenty of time to dry — you don't want to knock bricks loose. Any horizontal reinforcement, such as barbed wire, has to be set in grooves so nothing sticks above the stringline. The bottom surface of each brick also has to be flat before the brick is laid (there can be hollows, but no bumps).

Both the base and the brick to be laid have to be bone dry. Do *not* wet the brick before laying it. Have two buckets of mortar: one a thin slurry for the horizontal joint, the other a bit thicker for the perpendicular joints. Use the thin mix to pour enough onto the base for one brick. Use a handful from the other bucket to *butter* the end of the previous brick.

Pick up the next brick, and without wasting any time, place it in its proper position as neatly as possible.

A three (or four) pronged cultivator — a great mud mixing tool.

You now have about three seconds for adjusting its position before the mortar sucks on and sets like contact glue.

The need for speed makes this method a skilled job for experienced mudbrick layers only. The final result looks great, because the mortar joints are about 6 mm (1/4 inch) thick. More important, wall settlement due to compression and settling of the mortar will be eliminated, and mortar cracking will be minimal. This is the *only* way to use reactive clay as a mortar.

The alternative is to make mortar out of something else. Some people make half strength brickie's mortar (12 parts brick sand : 1 part cement : 1 part lime). This is quick and easy to use, and can be mixed in a concrete mixer. Incidentally, the reason for half strength mortar is that the usual 6:1:1 mix would tear the wall apart in response to stresses set up by moisture and temperature changes. All components of a wall should be as nearly equal in strength as possible.

Other mixes that work well are the local clay mixed with sand, sand and cement, or low humus-content topsoil. What works with one clay may not work with another, so this is a matter for small scale experimentation. Build a short section of wall eight to ten courses high. If it stands up without problems after a week, the mortar mix should do. Nevertheless, on the house itself, avoid going more than four courses high in one session.

Rendering

Let the completed wall go through a whole summer before rendering. During this time it will settle, leaving gaps at the top. It will shrink away from timber members such as doorjambs, and there will be a few cracks.

Look for kaolin-rich clay within a reasonable distance. This is soil which dries rock hard in the summer but doesn't crack. Bring home a trailer load, and use it as a grout for all those gaps and cracks. If none is available, make up a cocktail from your soil, like one of those described above as good mortar.

Once cracks are patched, wet down a section of wall, and scrub it hard with a stiff broom or scrubbing brush. This seals and compresses the surface, and greatly improves the appearance. Whatever render you use, put it on a freshly wetted wall.

A wall made from heavy clay mudbricks will expand and shrink in response to weather changes. This doesn't affect its strength or durability but it does mean that a hard stable render like whitewash will come off it. You need a flexible render.

The best recipe I have seen is a mixture of one part fresh green cow manure to four parts of slaked lime, watered to a paint-like consistency. It stays on well, has a beautiful colour (white with a green glow — can be modified by using muddy water), and allows the wall to 'breathe' while keeping out driven rain. It is a good coating for both outside and inside surfaces.

If you want a completely waterproof coat, use Ruth Cilento's 'Pilgrim Fathers' Whitewash' (see EG 43): a mixture of lime, rock salt and dripping. Mix three kg of lime and 500 g rock salt. Dissolve 370 g (3/4 lb) of rendered fat in a kerosene tin of boiling water and slowly stir in the lime-salt mix. This will cool into a thick cream which softens with stirring. One warning: don't put a waterproof coating on both sides of a wall, because the wall must be allowed to breathe, to adjust in moisture content as air humidity changes.

It is best to seal the outside, but let the inside breathe, because this evens out humidity changes inside the house. An earth-walled house with a permeable render is a nice place to be in because the air is never dry and never oppressively humid. No mould in unheated rooms!

Plastic can also be used if you are that way inclined. Don't use concrete sealants like Bondcrete: they'll bubble off over time. You can thin plastic latex paint (clear, or coloured to your taste) to about half brushable thickness, and spray on. The latex paint soaks into the wall to a depth of several millimetres, and completely stops weather penetration.

So, there you go. If I were buying land, I'd avoid a block on heavy, sticky clay. I'd go for a spot with clay-loam, or sandy soil (and use rammed earth). But if sticky mud is what you have, don't despair. It will make a beautiful, strong, durable and comfortable house, even if with somewhat more effort.

Homebirth Australia Newsletter

access

One in five Australian babies are delivered by Caesarean section and many thousands of women now have Caesareans as part of their obstetric history. When they become pregnant again too many will be told that they cannot give birth normally: "Once a Caesarean, always a Caesarean". This repeat surgery will almost certainly be unnecessary.

Studies have shown that Vaginal Birth After Caesarean (VBAC — "veeback") is far safer than repeat Caesarean for the mother and the baby. Also, their psychological and long-term benefits (such as more successful breastfeeding) are enormous. Yet too many Australian doctors are following the American trend towards repeat Caesarean sections, bringing a rate which is reaching epidemic pro- portions.

Anyone who would like to know more about VBAC in Australia (whether at home or in hospital), should read the current issue of Homebirth Australia Newsletter: its theme is VBAC with a comprehensive article, book review and extensive resource list. Send $2 to Homebirth Australia, PO Box 107, Lawson, NSW, 2783.

Cider from the days of old

by Sophie Masson

Guyra, New South Wales.

Cider is a very ancient drink. In the areas where cider was produced, it was the tipple of the people, along with beer — the peasants' drink *par excellence*. There are many old songs which recall cider's domination of the countryside in the old days — many fond memories connected with the magic apple juice.

Today cider has become, like every other drink, the property of a few large companies, and there are many people who feel that more's the pity. The old apple orchards of Normandy and Brittany, Worcestershire and Somerset, Tasmania and Victoria, have by and large been replaced with uniform plantations of dwarf apple trees of only a few varieties, while the hundreds of cider apple varieties have disappeared into the mists of time. In Australia, cider apples are a rarity. Most 'cider' is made from eating apples such as Granny Smiths, which do not produce the strong, mellow drink that cider used to be, but more a sort of alcoholic apple juice.

While I was in Britain a couple of years ago, I came across a very interesting place called The Museum of Cider, in the beautiful old Welsh border city of Hereford. The Museum was set up by the Bulmer family who are famous throughout the world for their cider. It is a unique establishment with much to offer the visitor.

The Museum of Cider is housed in a former cider works and tells the history of cider from its very beginnings to the high-tech affair it is these days. Many of the exhibits in the museum had been in use for hundreds of years. One of the most impressive is an enormous 350 year old French beam press, found in an old Norman farmhouse and once pulled by a horse. Unusual cider drinks like champagne cider, cider brandy and the pear equivalent, perry, are highlighted and the museum produces its own cider brandy (in Normandy it is known as calvados). They are the first English producer of this drink for more than 200 years.

The King Offa Distillery, which is the works in the museum, also produces a drink called Cider Royale, once known as 'England's wine', as well as cider apple liqueur, perry and an apple aperitif. The possibilities with the fruit seem endless.

The museum also houses some wonderful old documents relating to cider, such as the 'Pomona Herefordiensis', in which the many hundreds of ancient cider apple varieties are detailed. The cider apple is a very different fruit indeed from the eating and cooking apples we know. For a start, it often tastes very sharp; it is not meant to be eaten. Its flesh has a fibrous texture to make it easier to extract the juice, which is high in tannin and sugar but low in acid. The two cider apple varieties mostly used these days are the Cap of Liberty and the Genet Moyle. Cider was renowned for medicinal properties. Captain Cook took a supply of the tipple on board the Endeavour and his other ships to prevent scurvy.

'Cidermaking in Devon', from the *Illustrated London News* of October 1883.

Although cider was very much a drink of the people (indeed part of a farm labourer's wages were once paid in cider), it was certainly not scorned by the gentry, who drank it not out of the rough cider mugs, but from elegant twisted-stem glasses. Cider lost some ground to beer during the Industrial Revolution — beer being much more a city drink — but recovered during the 19th Century and today in Britain more and more people are drinking cider.

A 'Real Cider' movement has been formed and there are a number of small cider presses all over the country producing the strong dark brew. Some of the old recipes for cider were truly rather fearsome; one of them, featured at the museum, recommends putting five pounds of the best beefsteak into the brewing juice! Cider with a bellow.

Now there are basically two types of cider — sparkling and still — and four flavours: sweet, bittersweet, sharp and bittersharp. I've included a recipe for a traditional cider which you can try, using perhaps a mixture of Granny Smiths and crabapples. This is very much a 'curiosity' recipe. However, a modified or 'small' cider can be made using pure apple juice made from dessert apples.

Traditional cider

for a volume of five litres
five kilos of apples
3 Campden tablets
1/2 a kilo of white sugar
yeast

Crush the fruit in a tub with a heavy piece of timber, or use a hand grater. The fruit must be minced or crushed and then pressed before the pure juice can be extracted; any other method will require dilution with water. Watch out though — apple juice and cider are very corrosive, so avoid using zinc, iron and copper containers. To press the fruit you can also put it in a hessian bag and use a mangle or wringer to press out the juice.

Add the sugar. Dissolve the Campden tablets in each five litres of juice and run it into clean jars. Next day add a general purpose wine yeast culture and keep at 15-21 °C. At first a froth will be extruded from the necks of the jars but eventually the gas bubbles break on reaching the surface. At this stage clean the mouth and outside of the jar and insert an airlock.

Allow fermentation to continue until all the sugar has been consumed. Dry cider can be prepared by transferring the jar to a cold room until the cider clarifies. Syphon off the yeast deposit and keep it in a filled and sealed jar for two or three months, then syphon it off again and fill into bottles. Cork or crown and store for a few weeks before drinking.

Sweet ciders can be prepared by adding between 125 and 250 g of sugar per five litres of first syphoned cider. Store at 15 °C under an air lock, and allow any fer mentation to go to completion. Chill the jar, syphon off the cider when it has clarified, sweeten to taste again and keep at 15 °C again. Continue until the sweetened, syphoned cider is no longer fermented by the much reduced yeast. Chill, syphon, and store under a safety bung for several months, re-syphon and fill into champagne or beer bottles. Cork and crown and store for a few weeks before drinking.

If anyone's interested in writing to the museum and getting information or a catalogue of some of the books and other items they sell, they're at the Cider Mills, 21 Ryelands St, Hereford, United Kingdom, HR40LW.

Getting the drum: warning

by Chris Martin

Coonabarabran, New South Wales.

Over the past few years a number of articles on using (44 gallon) drums have appeared in *Earth Garden* and with two in EG 54 we feel that we should give EG readers an urgent warning. Possible problems arise when recommending use of a cold chisel to open the drum top. There have been a number of very bad accidents where people have been maimed and even killed doing this (as recently happened to a young child in our area when the drum his father was opening exploded). The following points may appear to be plain common sense but we know it is better to be safe than sorry.

Type of drum

Try and get a drum of known origin. Food drums are often advertised at reasonable prices in country newspapers, such as *The Land* and *The Weekly Times*. Old fuel and poison drums are a definite **no-no!** Petrochemicals and poisons have a habit of penetrating the drum wall.

Cutting drums

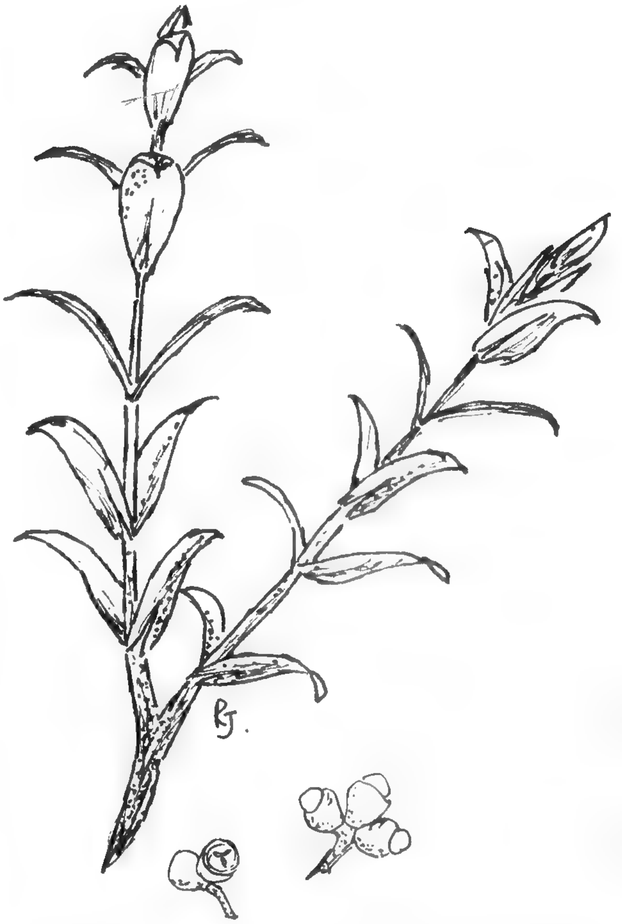
The food drums mentioned above often have removeable lids so there's no need to do any cutting. If you are unsure of the drum's origin the safest way is to fill the drum with water and use a bolster and cold chisel. ***Do not use an angle grinder or oxy cutting equipment, especially with an empty drum.*** Using this kind of equipment can be a fast road to the great *Earth Garden* in the sky because explosive gases can result from the heat.

We hope that anyone advocating the recycling of drums, for example Hot Drum, would carry such a warning in the opening paragraph of their instructions.

*Hot Drum carries clear warnings in its instructions on the dangers Chris has described above and the need for extreme care in selecting and preparing a drum. In fact, the owner of Hot Drum, John Gilpin, states in the instructions that readers should "consider any drum to be a potential bomb". Like Chris, John recommends filling the drum with water after washing it out twice with detergent, if it has ever contained petrol, diesel or any other inflammable fuel. Thank you Chris!

Robin's eucalypt: the discovery of a lifetime

by Robin Jean
Braidwood, New South Wales.



Robin's gum, and Australia's rarest and most recently discovered: *Eucalyptus recurva.*

Illustration by Robin Jean.

During 1985 Greg was offered a job as a temporary ranger with the National Parks and Wildlife Service of NSW. The job, which he took mainly for the experience, was for six weeks. As well as dealing with the routine work of a ranger he was to conduct an environmental impact study for a proposed car park and camping area on the western side of Morton National Park not far from Braidwood.

Because his experience and interest lies mainly in the fields of mathematics, computer science and economics he enlisted my help in the work of identifying the various plants on the proposed sites. There were two suggested sites. One was cleared and had been a dump for fencing materials by a previous owner and which bushwalkers and other visitors to the park were currently using. The other site was very attractive to look at because it had not been cleared and no one had started to drop 'ring pulls' or drive cars through it. The National Parks & Wildlife Service preferred the first site but some of the money for the car park had been put up by a Sydney bushwalking club and a foundation associated with a bushwalking shop. So they were being allowed a say in where the car park would be.

We did the environmental impact study and found (as might be expected) a much greater variety of plants on the unspoilt site. One of these plants is the rare and endangered *Eucalyptus gregsoniana* which is the Mallee form of the white smow gum, *Eucalyptus pauciflora.* I have a soft spot for Mallee forms. They are often very attractive to look at and I find their small size intriguing. I normally associate eucalypts with the tall straight specimens we see in some of the beautiful coastal forests, and so gnarled and stunted ones are to me an anomaly. Much to my delight, it turned out that there are two other Mallee euclaypts found in the area too and so this added to the attraction of the place.

At this stage it looked as though the bushwalkers would have their way and the rare and endangered species would go. So in our spare time we started to look for more species in other places, notably on private land where the landholders *might* respect the value of the trees a bit more and where the trees would be less subject to the vagaries of bureaucrats and politicians.

During one of our forays I found a tree which at first glance I took to be one of the other Mallee eucalypts growing in this area: *Eucalyptus moorei.* However, on closer examination it turned out not to be. We took some samples home and studied them at great length, comparing them with the literature we had on the subject. Now, although I have qualifications in the botanical field, they do not include much plant identification and my interest in this subject over the years has been to distinguish the exotic from the indigenous and condemn (to a certain extent) the former. Through growing native plants in my various city gardens I have also come to be able to identify a few by sight. So when I say I compared the samples we had collected with the available literature this means that I took all our borrowed books on plants of the south eastern region of Australia from the shelves and looked at the pictures.

At the end of two weeks I had decided I didn't know what the plant was. The closest I could manage was *Eucalyptus vernicosa* which is only found in Tasmania. I didn't think that it was this eucalypt but the reason I didn't laugh at the idea of finding *Eucalyptus vernicosa* (or something similar) in the Braidwood region is that there is a boronia which is common in Tasmania and is also found near Braidwood and has been found at no place in between.

We consulted some native plant freak neighbours who couldn't help so finally we sent a sample with them to the Botanical Gardens in Canberra. Around a week later our friend rang with the news — in fact two pieces of news. One was that the eucalypt was a totally new species and the other was that his wife had gone into hospital in premature labour. I'm still not sure which he considered was the more important!

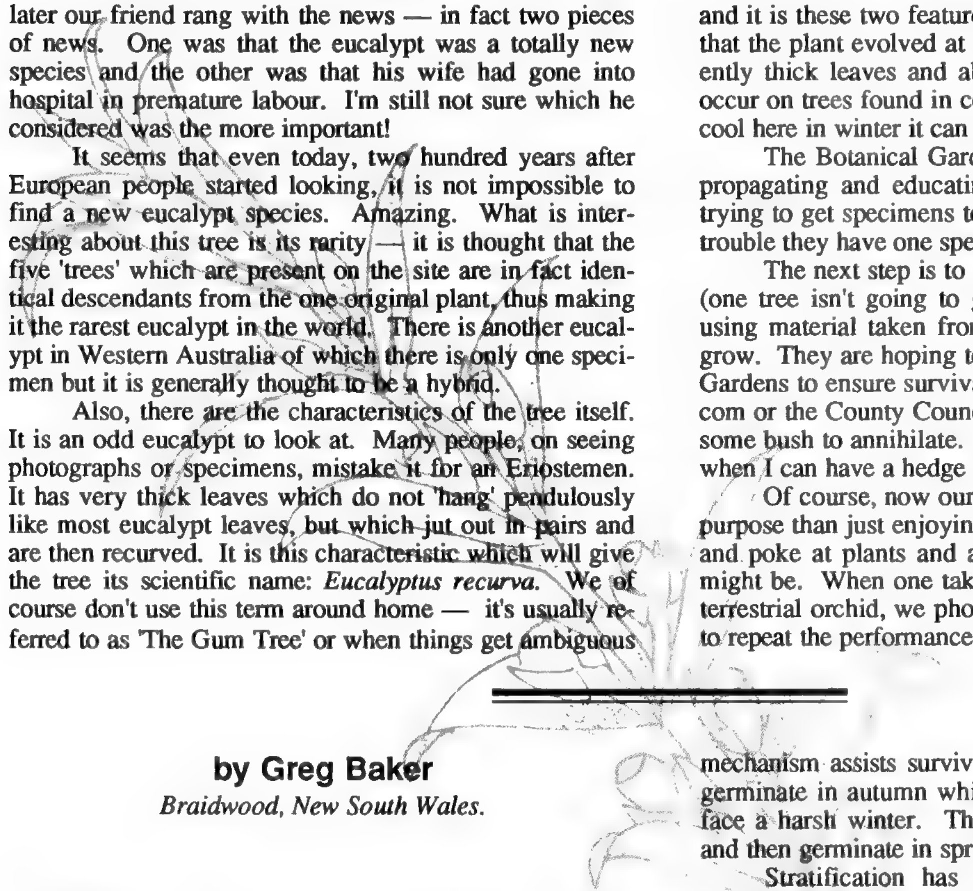
It seems that even today, two hundred years after European people started looking, it is not impossible to find a new eucalypt species. Amazing. What is interesting about this tree is its rarity — it is thought that the five 'trees' which are present on the site are in fact identical descendants from the one original plant, thus making it the rarest eucalypt in the world. There is another eucalypt in Western Australia of which there is only one specimen but it is generally thought to be a hybrid.

Also, there are the characteristics of the tree itself. It is an odd eucalypt to look at. Many people, on seeing photographs or specimens, mistake it for an Eriostemen. It has very thick leaves which do not 'hang' pendulously like most eucalypt leaves, but which jut out in pairs and are then recurved. It is this characteristic which will give the tree its scientific name: *Eucalyptus recurva*. We of course don't use this term around home — it's usually referred to as 'The Gum Tree' or when things get ambiguous as 'Robin's Gum'. The leaves are studded with oil glands and it is these two features that lead scientists to suppose that the plant evolved at a time colder than now. Apparently thick leaves and abundant oil glands usually only occur on trees found in cold climates and although it gets cool here in winter it can hardly be called a cold climate.

The Botanical Gardens, in their role of describing, propagating and educating the public about plants, are trying to get specimens to grow in captivity. After much trouble they have one specimen about ten centimetres tall.

The next step is to attempt to germinate more seeds (one tree isn't going to go far) and also to try cloning, using material taken from the plant they've managed to grow. They are hoping to get it growing in the Botanical Gardens to ensure survival. You never know when Telecom or the County Council are going to select at random some bush to annihilate. I am looking forward to the day when I can have a hedge of them growing here.

Of course, now our bush rambles are times of more purpose than just enjoying the atmosphere. Now we peer and poke at plants and animals and muse on what they might be. When one takes our fancy, say a boronia or a terrestrial orchid, we photograph and memorise it and try to repeat the performance.



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by Greg Baker

Braidwood, New South Wales.

The discovery of Robin's gum, as with any new species, led to a flurry of activity by botanists — in this case led by Dr Mike Crisp from the Australian National Botanical Gardens (ANBG) in Canberra.

This activity has two main aims. The first was to describe scientifically the new species; the second to try to propagate the plant in botanical gardens to ensure its continued survival.

The process of description is a long and thorough one. It began with the field collection of plant material — bark, buds, fruit and leaves. Next the botanical literature was examined to see whether the plant had been previously described. Finally the plant material was examined and described.

The published botanical description of a new species such as Robin's gum is an exhaustive listing of the properties of the specimens. It is given in Latin, the international language of botanical descriptions, and English. The description also includes an assessment of the plant's affinity, that is, what its closest relatives are, and how it fits into the evolutionary framework — the basis of all plant classification.

Propagation of the gum has proved difficult because of low fertility. Conventional techniques failed, so Mark Clements from ANBG used a technique known as stratification. This technique refrigerates the seed for about six weeks before attempted germination. The refrigeration is a simulated winter and it is necessary in some cases to overcome an in-built mechanism in a plant. This mechanism assists survival by ensuring that seeds do not germinate in autumn which would leave the seedlings to face a harsh winter. They must go through winter first and then germinate in spring.

Stratification has been successful because some seeds have germinated. To date, however, only one seedling has survived and grown. Attempts will continue using stratification and also tissue culture (cloning of plant material from seedlings).

Part of the reason for the low seed viability and the difficulties experienced with propagation is that it is possible that all the known trees are genetically identical, being outgrowths from the one underground lignotuber. A lignotuber is a reservoir of plant material which is able to shoot and produce new plants if the aboveground plant is destroyed. Contrary to popular opinion, it is only gums with lignotubers that can survive intense bushfire. Non-lignotuberous eucalypts are killed by intense fire and species survival is ensured by large numbers of seeds which germinate after fire.

To see whether the plants are genetically identical scientists from CSIRO have examined samples from each of the stems using the so-called isozyme technique but their results have so far proved inconclusive.

Propagation is essential, however, because as Robin has mentioned, the gum is Australia's rarest eucalypt. It is known from this one clump only, about four metres across, consisting at most of five individual trees.

Although the known plants in the wild have survived probably for thousands of years, those modern vandals of the bush, government or government-authorised wielders of chainsaws and bulldozers, cannot be relied upon to notice, let alone respect, such a small clump of trees.

"Some like it hot" ,and free

by Brian Priest

Whiporie, New South Wales.

When we first moved onto our property our main priority, other than shelter, was a shower. We had tried the 'jumping in the dam' and 'bucket up a tree' methods but we felt that a hot shower at the end of gruelling day in the paddocks would not be too much to ask for.

I was inspired by that amazing man, usually seen haunting Lismore's electronic stores, Peter Pedals. His articles: 'Incinerator Hot Water' and 'Solar Incinerator Hot Water', in *Earth Garden* numbers 43 and 49, provided much of the ground work. Most of the materials we picked up for nothing or bought secondhand.

Instead of the incinerator idea I opted for an old cast-out fuel stove, simply because it was amongst a motley collection of goodies that no one else wanted. Our collection also yielded a gas hot water cylinder, shower screens and the odd bit of plumbing.

We took the gas ring out of the cylinder and cut a neat hole, in the shape of the stove flue opening, into the bottom enclosure of the cylinder so that unwanted smoke would not escape. The cut was made directly under the open centre core (flue) of the cylinder. The top of this is blocked off with a tin can when the fuel stove is not in use.

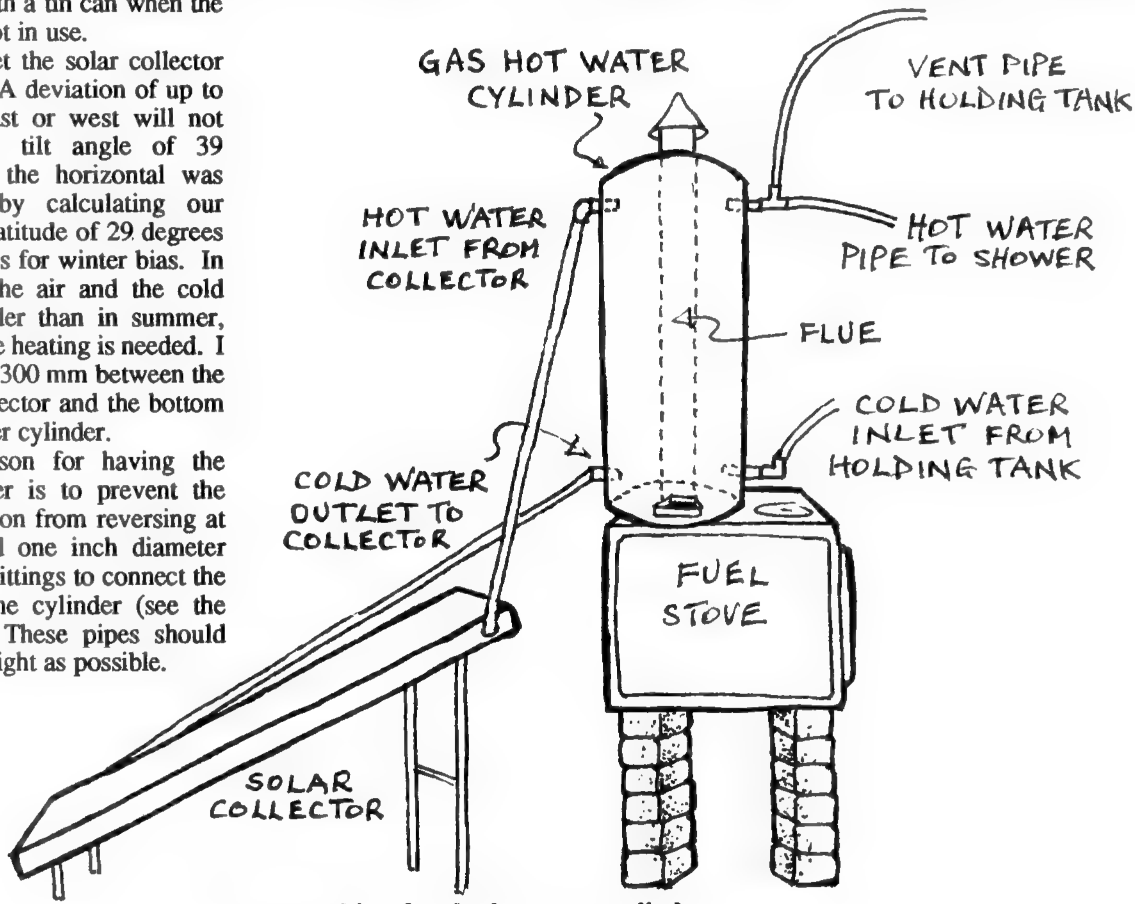
I then set the solar collector facing north. A deviation of up to 15 degrees east or west will not matter. The tilt angle of 39 degrees from the horizontal was worked out by calculating our geographical latitude of 29 degrees plus 10 degrees for winter bias. In winter, both the air and the cold water are colder than in summer, therefore, more heating is needed. I allowed about 300 mm between the top of the collector and the bottom of the hot water cylinder.

The reason for having the cylinder higher is to prevent the water circulation from reversing at night. I used one inch diameter polypipe and fittings to connect the collector to the cylinder (see the illustration). These pipes should be kept as straight as possible.

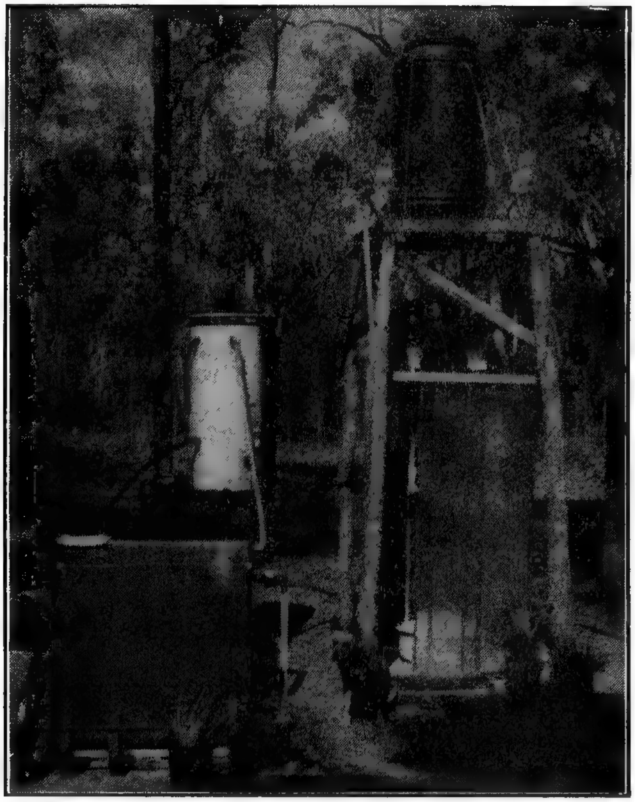
Next to this set-up is a sturdy, three metre high stand which provides enough headroom for the shower underneath and a platform for the header tank. The tank gravity feeds the hot water cylinder and provides pressure to the cold water tap in the shower below. This tank also supplies water to our caravan and to a separate kitchen. I happened to have a 200-litre plastic drum on hand so we used this for the header tank. It had to be secured to the platform with wire because of its shape. Because the tank was palstic it was easy to make the necessary holes in it. We used pieces of leftover polypipe to make the connections, including half-inch diameter pipe to carry hot water to the shower. We inserted a plastic tap about half-way along this to draw off hot water for other purposes.

Our cylinder did not come equipped with a pressure relief valve so I installed a vent pipe to release built-up water pressure. This can be attached via a T-junction in the hot water outlet pipe close to the cylinder, and directed to the top of the header tank. Our cylinder has an opening on top, under its lid, so I connected the pipe to it. The pipe has to be higher than the level of water in the header tank.

The hot water cylinder is supplied with water via a one-inch pipe from an outlet at the bottom of the holding


GAS HOT WATER CYLINDER
VENT PIPE TO HOLDING TANK
HOT WATER INLET FROM COLLECTOR
HOT WATER PIPE TO SHOWER
FLUE
COLD WATER INLET FROM HOLDING TANK
COLD WATER OUTLET TO COLLECTOR
FUEL STOVE
SOLAR COLLECTOR

The plumbing for the hot water cylinder.

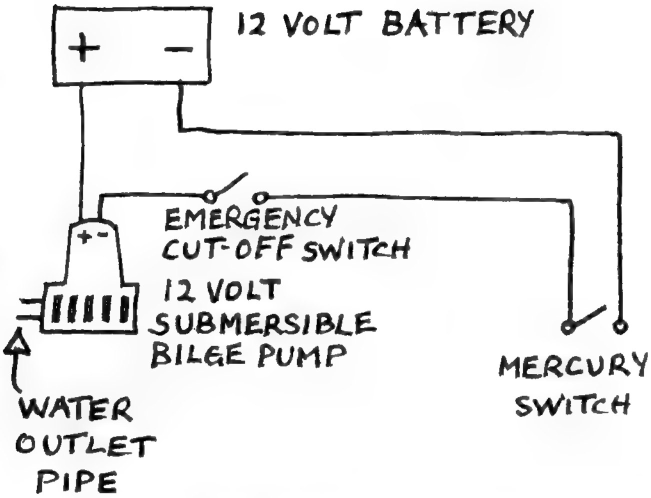


Brian's hot shower system (under heavy guard!).

tank. Most hot water cylinders have enough inlets and outlets to make all the necessary connections. As the water is heated, either through the stove or solar collector, it rises to be replaced by more cold water. All that is needed now is water to be fed to the holding tank to get the whole system going.

We pump the water to the holding tank via a $30 submersible bilge pump, obtainable from most marine suppliers. This little unit resides in the main water tank and is hooked up to a 12 volt power supply. It uses about half of one amp to top up the water level, so a car battery would be adequate. A length of polypipe (3/4 inch diameter to fit the pump outlet) runs from the pump to an opening in the top of the holding tank.

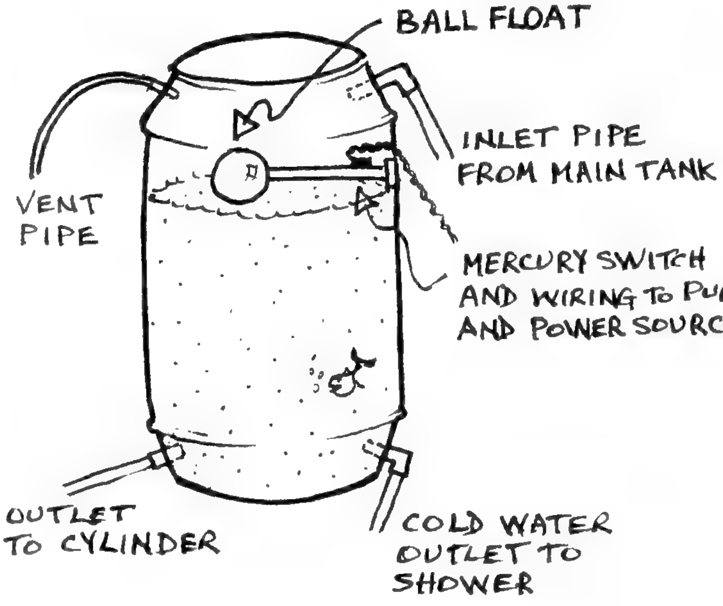
We rescued a ball float from a damaged lavatory cistern and fitted it to a hinge on the top part of the holding tank. Attached to the arm of the float is a mercury switch ($1.50) which works on gravity. It is sol- dered to the wiring from the pump and power source (see wiring diagram). When the water level drops to a certain point the blob of liquid mercury in the switch falls, thereby completing the circuit and activating the pump. When enough water from the pump has raised the float the mercury falls back, breaks contact and the pump automatically cuts out. An 'on-off' switch has been added to protect the pump in case the water in the main tank falls below the level of the pump.



The wiring arrangements for the automatic pump.

During the winter months we simply light a fire in the fuel stove to boost the hot water. In warmer months this is unnecessary because the solar collector provides us with a surplus of very hot water. Luckily, the thermostat was still attached to our cylinder and we use this to gauge the temperature of the water by turning the dial until a click is heard. The reading on the dial at that point indicates the temperature inside the cylinder.

This system has been running for almost a year without a hitch or the need for maintenance. We merely step inside the shower and turn on the taps. Some of us really do like it hot!


BALL FLOAT
INLET PIPE FROM MAIN TANK
VENT PIPE
MERCURY SWITCH AND WIRING TO PUMP AND POWER SOURCE
OUTLET TO CYLINDER
COLD WATER OUTLET TO SHOWER

The plumbing for the holding tank.

'Doing time', and learning with the owner-builder apprenticeship

by Bill Lowe

Coolum Beach, Queensland.

Ever since I was 15 I'd wanted to build a house of my own in the country but through lack of work and money nothing ever came of it. I'd been drawing plans and looking at an old book called *Australian Carpentry* and thinking about materials. Eventually, with $10,000 saved up (not quite enough for the acres we wanted) Andrea and I bought a block of land (800 squ m) at Dundowran — a sugarcane and pineapple farming area five miles from Hervey Bay in Queensland.

It was a beautiful area and the land overlooked the beach and farmland. I was unemployed at the time but we acquired a bank loan for $7000 and put in $3000 of our own savings and bought the land, which left us with $7000 for building.

Andrea and I worked out a plan for a basic two bedroom house and did all the necessary ground work with owner-builder forms. I hadn't had any experience in building work to boast of, but I'd built up enough self confidence and enthusiasm over a few years — that was all I needed. It was September '84 and, after getting council approval, I couldn't wait to get going. I'd already dug all the post holes before approval and I was incredibly excited about the whole venture. We only had a small box of tools, about $200 worth — in fact no power tools at all.

I discovered a bush sawmill about 80 miles away and found that we'd save $1000 on the timber alone instead of buying from the local yards in town. I made a point of always asking for a discount, which usually brought a frown to the faces of the people we dealt with, but saved us a lot of money in the long run.

We used steel posts which we found to be the cheapest method (the land has a slight incline) and put the bearers and floor joists on. Andrea kept our baby safely away from the dangers of the building site, which left me to work on the framing myself. I had to pre-drill all the nail holes with a brace and bit because the wood was so hard. Andrea would give me a hand to stand them up. From then I did the rest myself, dragging the trusses over from the timber stack a couple of blocks away and, with help from a bit of rope, put them in position. I was having a great time seeing everything go up.

I put all the roofing iron and ridge capping on one long day and was incredibly sunburnt and happy that night. I fixed in some old casement windows I'd bought in Maryborough and then the sisalation, which is a bit difficult when you're by yourself and the breeze won't let up.

I didn't realise we had to use only steel rods and straps. They cost us a bit extra but because we were in a cyclone area it was all just part of the regulations. I had to buy a book which explained distances between rods and sizes, and is pretty mindblowing at first but quite simple when you get the gist of it. I remember boring through 9 inch bearers for the cyclone rods with my (Kmart) brace and bit from underneath. Luckily it lasted for the 50 or so before it died. I had a very strong right arm after that.

Our fridge broke down about this time so we bought a new one and after paying for that and also a ridiculous $300 for a council water meter our funds were depleted. Luckily, we were only a couple of hundred dollars from lock-up stage.

We applied for the first home-owner scheme and received $3000 cash, which allowed us to finish off the house. I found an electrician who let me labour for him and all up these materials cost only $250. My good brother Laurie (an amateur plumber) did 95 percent of the plumbing using mostly secondhand taps — this worked

Andrea and Bill's first home at Dundowran in Queensland.

The house frame with the roof on: buying the timber from a bush sawmill saved over $1000.

out very cheaply. We bought an old gas stove and a small secondhand German instantaneous gas water heater which both proved to be tremendous economy savers.

We moved in just before Christmas '84 and only had a few walls to line. We used gyprock because of cost and did all the messy work ourselves. We remember our little boy Joshua (about one year old then) giving us a smack on the head when he woke up in the mornings through the not-yet-lined bedroom walls. We were very pleased to be in our home and not having too much money to repay.

It was a very practical first home — be it ever so humble — and I enjoyed building it. I think most people have it in them to do just as we did with very little money and hardly any knowledge. We have sold that house and have built another on the Sunshine Coast.

I have been out of work quite a lot in this time and am ready to help with advice or practical building help to anyone who writes or phones me*. I have some good ideas on plans, also I make slab furniture which looks good in a new owner-built home. I plan in the future to give assistance to low-income families like ourselves with the same aim, to change the great Aussie dream into practical reality.

***Bill Lowe, 14 Entwood Ave, Coolum Beach, Queensland, 4573; phone (071) 461315.**

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Build your own sauna

by Thomas

Tallebudgera Valley, Queensland.

Friends and I have just built a sauna for winter and it is so successful that I hope this will encourage others to build one.

The main value of the sauna is its function as a waste eliminator — via sweat — and this is something we all have in common (ie impurity!). Therefore, for us, by building the sauna down near the creek in a sort of 'common ground' it serves as a community resource and unifying activity.

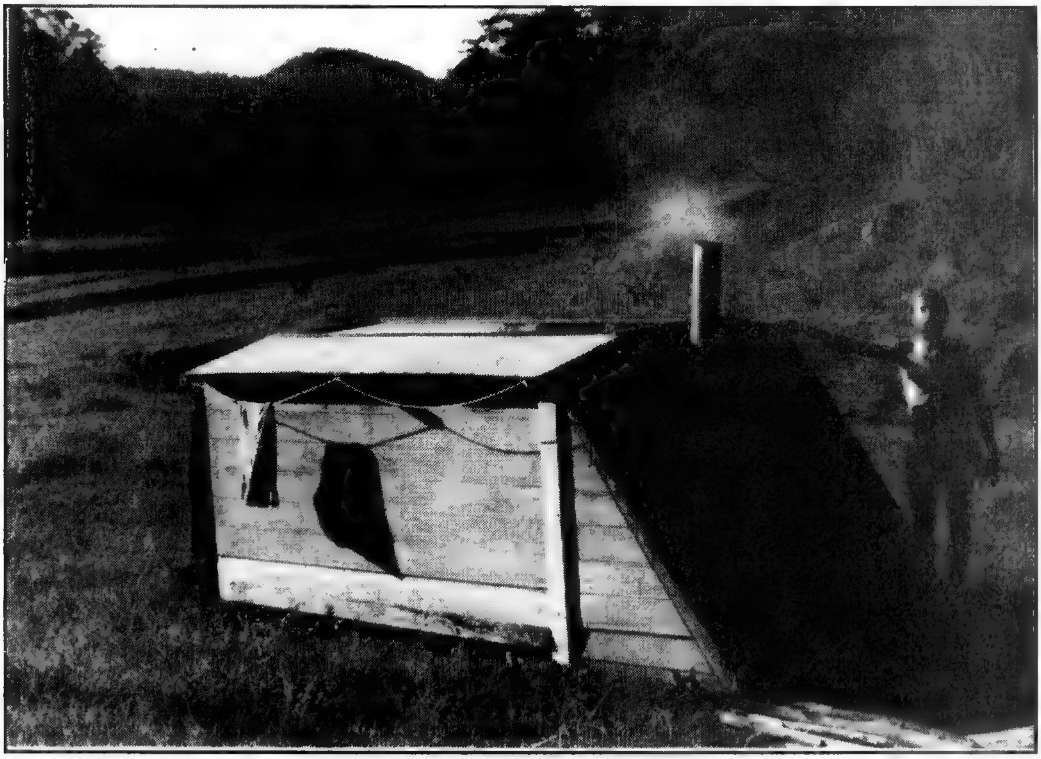
You need: a location which gets afternoon sun in winter, somewhat sheltered from the wind, and of course near fresh water, and a place where a wood fire is not a hazard or a nuisance.

We used to use the American Indian technique of hot rocks shovelled out of a fire and placed in the enclosure but this is terribly inefficient on firewood. This new model is both more efficient and quicker (almost instantaneous).

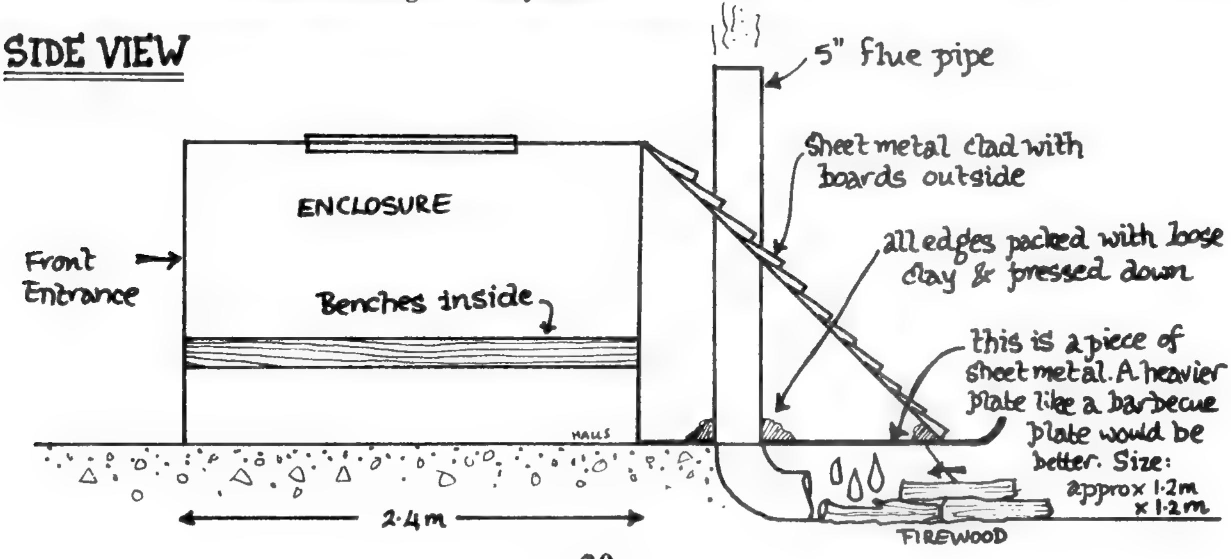
The structure is basically an airtight box. (Any design or material is possible but I'll describe ours). Then the heating is by means of an internal flat piece of sheet metal at ground level and a flue pipe which rises up from this and out of the enclosure in such a way as to avoid smoke leaks (and not burn down the structure).

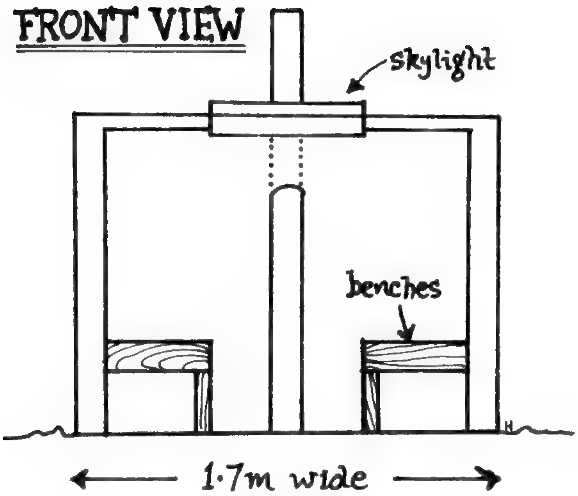
The walls are double wall construction with a piece of black plastic in between as well to prevent air leaks. We used tongue and groove pine on the inside, and weatherboard on the outside.

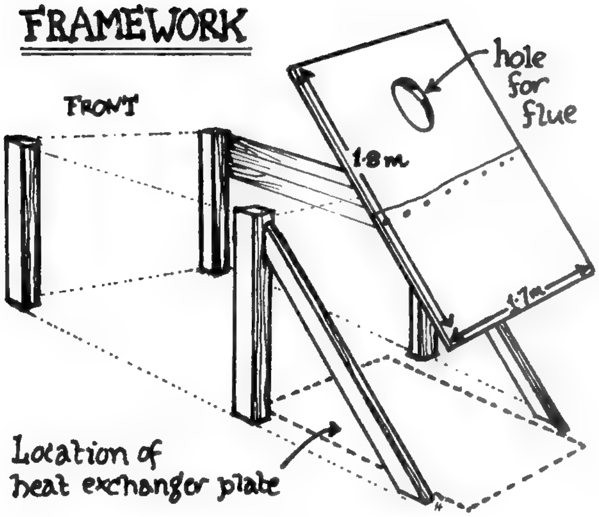
The roof is plywood with flat galvanized sheet metal over it, and in the centre is a skylight which was an old



The Tallebudgera Valley sauna.


SIDE VIEW
5" flue pipe
Sheet metal clad with boards outside
all edges packed with loose clay & pressed down
ENCLOSURE
Front Entrance
Benches inside
this is a piece of sheet metal. A heavier plate like a barbecue plate would be better. Size: approx 1·2m x 1·2m
HAUS
2·4m
FIREWOOD



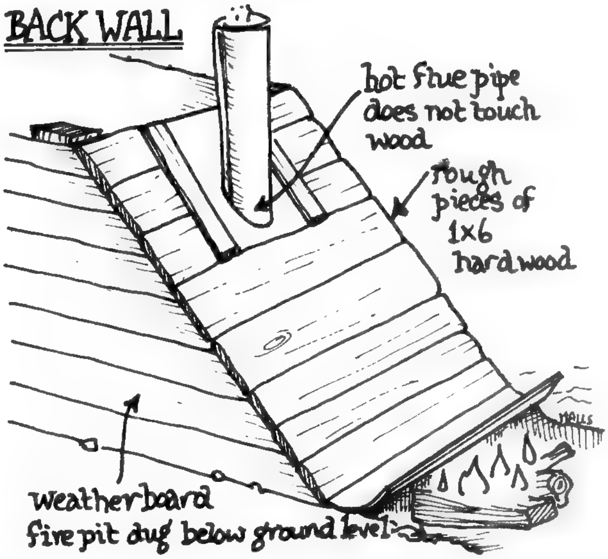


glass door. The skylight definitely adds charm and spaciousness to what would otherwise be a more confining wooden box.

The sloping back wall is also made of flat galvanized metal which is nailed to a framework as shown. This large piece of tin will go onto the sloping diagonal framework and become the back wall. Then timber is nailed over this tin to make a solid back wall as in the accompanying illustration.

The exact specifications will always depend on materials available and skills of the builder. Brick or stone would perhaps be a better material for the side walls.

My main contribution is to say, first of all that it is a good, wholesome and communal activity to add to your lifestyle in winter. Also, I recommend the internal heat exchange plate being at ground level to make the whole sauna ritual about as easy as lighting up a wood stove for a cup of tea. This means you can use the sauna on those wet wintery days when it is wanted most. This is not the case with the hot rocks method because you can never find enough dry wood then.


BACK WALL
hot flue pipe does not touch wood
rough pieces of 1x6 hardwood
weatherboard
fire pit dug below ground level

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A SHACK INTO A CASTLE

by Sophie Masson

Guyra, New South Wales.

Well, in a manner of speaking our house still isn't a castle, but at least it's come a long way from the medieval hovel that used to squat at the front of an overgrown block.

We moved to New England a year ago, after my partner David decided he'd like to ally his ten years practical farming knowledge to a university degree. We didn't want to live in Sydney, so we chose the University of New England and made tracks from the subtropical lethargy of Coffs Harbour, where we had been living, to Armidale high up on the Tablelands.

At first we rented a house in Armidale. House prices everywhere had convinced us that with the state of our finances we could only rent. But pretty soon we got tired of handing money hand over fist to the real estate agent, and a mate of David's at uni pointed us in the direction of the little town of Guyra, half an hour's drive from Armidale, where apparently dirt-cheap houses could be bought (he and his wife had just purchased an $8000 house on half an acre, in town).

We rushed up to Guyra to investigate and sure enough we found *it*. It is a two-bedroom fibro house, about forty years old, on half an acre of magnificent chocolate soil with some established trees, on a quiet street. It looked awful when we first saw it knee deep in junk, the garden covered in weeds, no sink in the entire house, cockroach nests, sagging blocks, the lot. But it was $11,000! We could afford it, and not have to be beholden to banks or real estate agents or other assorted hangers on. It didn't take us long to make up our minds.

The house was quickly ours, complete with 'curtains' (ragged pieces of net), 'lights' (plastic horrors) and floor coverings (vile linos, chewed carpets, ancient newspapers). We moved in during September, just after the worst of winter — for Guyra is one of the coldest places in the country, at an altitude of 1320 metres (over 4000 feet), snow in winter, bitter winds, frosts 80 or 90 days of the year. The house was freezing and winds came in from everywhere.

But we set to work. If you're a 'couple' I wouldn't recommend doing what we did if one of you isn't a handy person. I'm not really — but David is terrific, and can turn his hand to just about anything. We have very little money — we live on AUSTUDY (TEAS), the money I can scrape together from freelance writing, and a bit of SS — so we can't afford to call in any experts or spend thousands on smart appliances. We had to do it the cheapest, but best way possible.

First of all, of course, came the big cleanup. Truckloads of rubbish later, we had at least a clean slate to start on. The kitchen was the first item to tackle — we didn't fancy doing the washing up in a bowl on the floor. So we bought a sink in a garage sale and installed it, setting it into a home-made sink unit of pine which David made entirely with hand tools (we couldn't afford the electrical gadgets). We also pulled down the wall the sink was set in, insulated it, and covered it with panelling pine. One of the things you notice, if you're doing up a house is the incredible cost of *everything*.

We tried to buy most major things secondhand, and in this category junk shops, garage sales and your local paper are great sources of goodies. We made a few mistakes by rushing into decisions. You haunt hardware shops, and there the old wallet receives a beating — every time we went, it seemed $100 changed hands, what with 'incidentals', like paint, nails, screws, sealant, estapol and wood.

The living areas

The living room and bedrooms were, if not easier, at least cheaper to tackle than the bathroom — affectionately known as the Black Hole of Calcutta — so we got stuck into them next. It is a source of great satisfaction to us, and never fails to cheer us up just how much difference a good coat of paint makes. The bedrooms were in the newer extension of the house, which had never been finished properly, so first of all we had to put up battens all over the walls and ceiling before priming, undercoating and finally topcoating it all.

We found we had to use a lot of paint, especially the oil-based undercoat — vinyl paint spreads much more easily. But it's a good idea to have the oil-based foundation: it seems to protect the walls better. We bought secondhand perfectly good carpet in a junk shop — enough for the whole house in those fashionable Berber shades for only $170 (the things people chuck out amaze me, this carpet would have cost thousands brand new). We installed the carpet ourselves, and here let me sound a warning — if you're at all allergic or prone to colds wear a mask while you're doing this job — it's incredibly irritating to the soft tissues.

Heating

Warmth was another important consideration. We blocked up all draught holes using carpet, wood, and those marvellous little tubes of sticky goo called 'No More Gaps'. You can find all those sorts of things, like No More Gaps, silicone sealant, and other wonders of modern technology in your local supermarket or hardware shop and they really are good. Convenient, and work very well.

As described in EG 54 we ordered a Hot Drum kit From John Gilpin in Queensland, and made one up. It made an enormous difference to the general well-being of the family and we were able to shed our parkas inside the house! We had thought we'd install a combustion stove in the kitchen plus a hotwater tank for the bathroom, and we bought them. But that plan has now been shelved for various reasons. The house came with a dinky little LP gas stove which has proved surprisingly good (you can even cook meringues in it, my sign of excellence) and it is amazingly cheap — one bottle costs $41 and lasts ten months. Also, we're on town water and mains electricity and the bills we were getting made it seem hardly worthwhile going to all the hassle of installing the Everhot.

We would have had to rip out a wall, buy flues, lug the enormous tank into the roof, and probably spend hundreds when all we had to do was buy a tank for a couple of hundred dollars and get it hooked up (we have had a 'zip' heater for hot water up to now). Also, the thought of having to light the Everhot in summer and cut all the wood to the right size was too revolting. We have plenty of free wood for the Hot Drum, but it's got a huge firebox, so you don't have to fiddle about for ages with wood. To me, there are better things to do in life than patiently chopping little logs. That little episode taught us to survey all options and not rush into what seems most attractive without considering all the factors. It would be different, of course, for someone not on mains electricity or town water.

The bathroom

The bathroom was a big job. The floor had to be raised, the plumbing and drainage done, the walls replaced, the bath installed and the laundry tub and washbasin put in. Bathroom fittings are ridiculously expensive. The cheapest, ugliest vanity unit was over $150, the daggiest laundry tub $200. But we waited awhile, and our patience was rewarded by a secondhand vanity unit, complete with Royal Daulton basin, and slightly damaged laundry tub. All they needed was a little work.

We covered the concrete floor in piping and insulated it, and then poured on a remarkable product called Aquabar — a sort of waterproofed chipboard. This is then supposed to be sealed with a special brand sealant but when we found out that the stuff was $80 for a small tin, we put our thinking caps into gear and came up with alternative sealants! First we undercoated the floor and then we gave it two coats of paint called Jet Dry, which can also be used for concrete. It gives a glossy, hard water-resistant finish and eliminated any need for lino or tiles. It's also very easy to clean.

We ripped out the walls, insulated them, and covered them with sheets of gyprock, which looks nice but is very hard to work with. Plastering all the joints is not easy. You also have to take great care when nailing it, because it cracks very easily (after all, it is only a thin sheet of paper over plaster). We painted the ceiling in gloss paint and the walls in semi-gloss. Don't paint bathroom walls in vinyl paint, it doesn't stand up to the damp, steamy atmosphere. We put ventilators in the ceiling — this is very important. However, you *don't* need electric fans — I find them annoying and we bought some plastic ventilators which work very well (the steam from the bath makes their fan rotate). Now all that remains in the bathroom is finishing the drainage, or at least providing ventilation for it. If you don't, the water pushes all the air out too fast, it can't get out, and your bath water comes gurgling up again.

Next step is the toilet. At the moment we have one of those wonderful pan affairs in the backyard — awful in winter because it's so cold, and awful in summer because of the blowies! However, the septic costs a fair bit, and now that uni's started again, there's no time till the holidays. There are a million and one other jobs to do — painting the outside, fixing windows and repairing holes. Not to speak of maintaining the garden. But that's another story.

This story is meant to encourage. It's not for everyone, expecially if they're not particularly handy. Many people looked at us in horror — here we were, two students, with very little money, one child, and one on the way (who has since arrived), embarking on a mammoth task. But it's worth it, definitely worth it, for the sense of independence and satisfaction it brings. We don't have the resources to build a house from scratch, or the money to purchase a 'dream' house — but we've learnt a lot, we've got things how we want them, and we haven't bankrupted ourselves or locked ourselves into a mortgage.

And this is a good place. Let me give a plug for Guyra. Wonderful soil, cheap prices, close to major towns, all the conveniences of town, great neighbours, big blocks, good opportunities for freelancing and great opportunities for gardeners. It's cold, sure; but I prefer that to the steamy weather of the coast.

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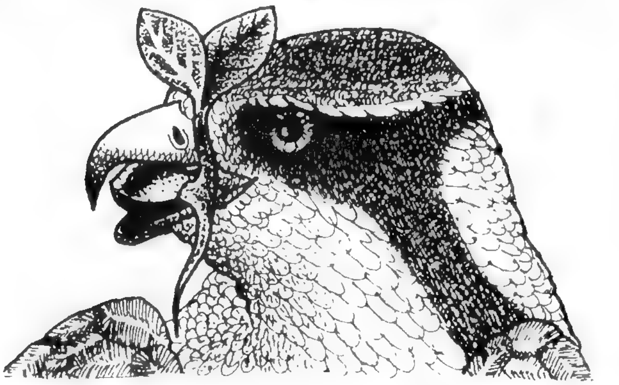

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Managing plant diseases

by Darren Phillips
Ivanhoe, Victoria.

This article, by an *Earth Garden* reader and postgraduate botanist at Melbourne University, looks at the science of plant pathology and specifically, the management of soil-borne diseases, from the point of view of a botanist, rather than a pesticidal maniac. We hope it will give readers an understanding of the underlying causes of disappointments such as a poor crop of avocados.

Plant pathology is the study of disease in plants. It is a discipline which tries to control diseases in a vast range of horticultural, agricultural and native plants. In Australia, plant pathology lacks a high profile in the eyes of governments and the community so, many devastating diseases*, past and current day, have had extensive and severe effects on the environment.

I want to deal with one example: the effect of the plant pathogen, *Phytophthora cinnamomi* Rands, on avocado. Common names for *P. cinnamomi* are: dieback, root rot or cinnamon fungus.

This fungus is soil-borne and belongs to a group of fungi known as the 'water moulds'. It can reproduce through either sexual or asexual spores (see the illustration). Its major means of dispersal is through asexual spores called 'zoospores' (pronounced 'zoe-a-spores').

Zoospores are small spores which can swim, when the soil is saturated, through the water-filled soil pores. The zoospores attack the plant roots, entering at the young root tips or sites of wounding. The young infected root tissue can be destroyed, becoming brown, soft and moist. The plant's uptake of water from the soil can be disrupted and may eventually lead to plant death from droughting.

The fungus can also produce dormant, asexual spores called chlamydospores which resist microbial attack, dessication and UV radiation. These spores can remain dormant and viable in the soil for up to six years.

Phytophthora cinnamomi was first isolated and described by Rands in 1922 in Sumatra, from bark cankers (decayed tissue that forms on trunks) on the camphor tree, *Cinnamomum burmanii* Blume. Since then, the fungus has come to be known worldwide as one of the most devastating, difficult and costly pathogens to control. Within the genus *Phytophthora* (from the Greek *phyton* for plant, and *phthora* for destruction), the 'cinnamon fungus' is now recognised as having the largest host range of any species. It can infect some 1000 species of plants in almost 300 genera in both temperate and tropical climates.

In Australia the pathogen was probably introduced at the turn of the century. Yet, it has already become widespread throughout the native forests and countryside of every State. Its rapid rate of spread is due to white man's activities. Infested soil and water have been distributed via activities such as: road construction and forestry practices, large scale agriculture, irrigation, spread of contaminated soil via vechicle transport and nurseries, and planting infected stock.

Currently more than 600 Australian native species have been recorded as hosts, especially members of the Proteaceae, Myrtaceae and Leguminales, and in some cases up to 75 percent of a native plant community may be susceptible. The pathogen also attacks a number of other agricultural hosts besides avocado, such as: macadamias, peaches and pineapples and horticultural hosts: azaleas, rhododendrons, camelias and some conifers.

Identifying disease symptoms

So how do you know if a plant you've just acquired is diseased? Many diseased plants show signs of abnormal growth which are called 'secondary symptoms'. Plants attacked by *P. cinnamomi* often show chronic yellowing (chlorosis) of the leaves, dieback of their outer twigs and branches, or wilting and premature ageing of leaves (see the photograph).

Unlike leaf diseases, such as those due to fungi which cause obvious leaf lesions, identifying soil-borne diseases can be difficult. One simple precaution you can take with plants newly purchased from a nursery is to look closely at the plant's root system when you're transplanting it to the soil. If the root system looks sick, that is, very brown, soft, pulpy or crumbly, either take it back to the nursery, show them (they may not know) and exchange it, or take it to your State's department of agriculture to test if the plant is diseased.

Many States have a work section set aside to help people identify plant diseases. For example, Victoria has a garden advisory section based at the Plant Research Institute, at the Burnley Gardens, in Melbourne. Many soil-borne diseases need to be confirmed by specialized culture (isolation) techniques. Such techniques can be done by the relevant body at the agriculture departments.

Disease control

If you find that your plant is being attacked by a pathogen what can you do about it? Once a disease has been

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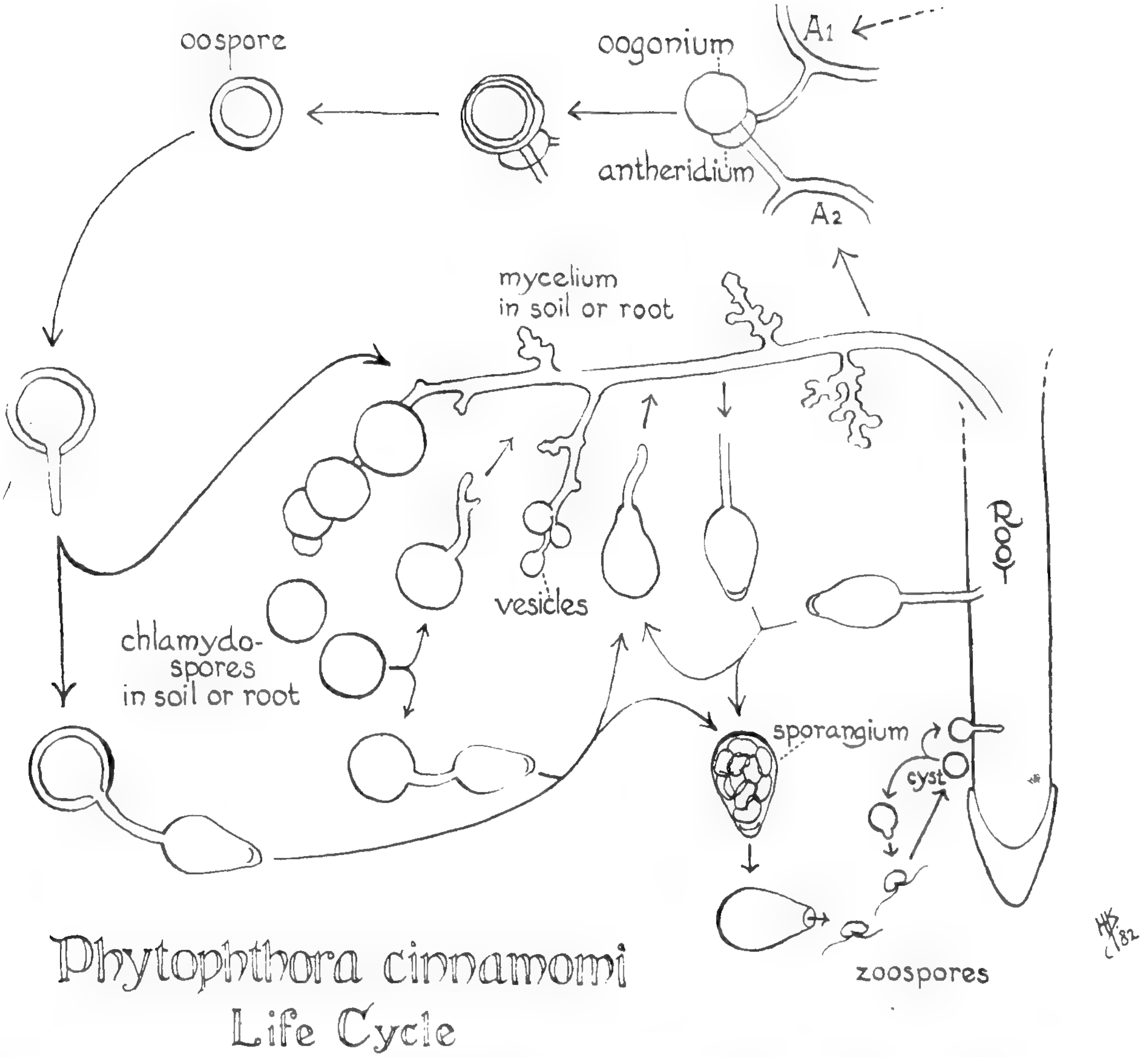
'Plant disease' is a nebulous term that can assume different meanings for different sciences. We will define it as: "Any harmful deviation from a plant's normal functioning of physiological processes".



Phytophthora cinnamomi
Life Cycle

diagnosed we can use a number of non-chemically based treatments. Most readers know that excessive use of insecticides, fungicides and herbicides over many years has enabled many pathogens, both insectivorous and microbial, to become resistant to them. Non-chemical, or biological means of control are now coming to the fore.

Non-chemical and biological control

Plant pathogens such as *P. cinnamomi* may have a role to play in the environment in breaking down organic matter and contributing to the nutrient cycle. However, if the pathogen goes unchecked an epidemic may arise. This can be caused by factors such as: **a.** host plant susceptibility (genetically ill-equipped to resist the pathogen), **b.** the plant is stressed by the environment in some manner before the pathogen attacks and so it is predisposed to disease attack, or **c.** the environment presents no microbial competition, inhibition or antagonism towards the invading pathogen. The 'deadly triangle of disease' illustrates this for soil-borne plant pathogens.

To combat soil-borne pathogens such as *P. cinnamomi*, the following measures are very important.

Microbial antagonism: The diversity and number of microorganisms help determine whether a soil type is 'conducive' or 'suppressive' to pathogens and disease. Their numbers greatly increase with increased organic content in the soil. *Phytophthora cinnamomi* has caused tremendous destruction in native plant communities in the beautiful jarrah forests of south-west Western Australia, and the floristically diverse and priceless heaths and woodlands of the Grampians, Wilson's Promontory, Brisbane Ranges and East Gippsland in Victoria. One thing these communities have in common is that they grow in soils which are poor nutritionally, structurally (see later), and microbially. These soils are termed 'conducive'.

This contrasts with the deep red earths or krasnozems of northern New South Wales and Queensland where avocados grow. These soils are characterised by very high organic content, nutrient levels, microbial numbers and good soil structure. These orchards are infested by *P. cinnamomi* but many do not exhibit any secondary disease symptoms at all. These soils are termed 'suppressive', and have high numbers of microorganisms, many of which are known to be antagonistic towards *P. cinnamomi*. Therefore, the importance and value of building up the organic content of a soil cannot be overemphasised, particularly if the soil appears to fit into the category of 'conducive' soils.

Soil structure: Soil properties such as: **a.** structure (the arrangement of particles to form compound units), **b.** pore size (the amount of space between particles), **c.** pore size distribution, **d.** drainage capacity and **e.** aeration, all directly influence the activity of the fungus in the soil and plant root system. This in turn affects the extent and severity of disease in the plant. The movement and availability of nutrients and water, two critical factors affecting plant health and vigour, are also intimately related to soil properties.

So deep soils with good structure and drainage, which enable the pores to refill with air after rain, limit *P. cinnamomi* zoospore motility (the ability of zoospores to swim through the soil). However, shallow soils with poor structure and drainage which flood quickly, or retain free water for long periods after rain, enhance zoospore motility. Shallow soils often have an impermeable base, such as clay, close to the surface. These soils can confine the bulk of the plant roots to the surface, crowding the roots into a small area and providing a concentrated food source which is ideal for root rotting fungi such as *P. cinnamomi*.

Therefore, if you live in an area where the soil is shallow, heavy, drains slowly and does not have a high organic content, it is a good idea to improve its structure by adding materials such as compost, sand and gypsum. Permaculture techniques can be an excellent way of doing this without intensive labour. The worms that are attracted to the surface help turn over and aerate your soil.

Rootstocks: Soil microflora and fauna populations feed on, among other things, compounds released from plant roots. So, if the number of plants in a forest or community is drastically reduced, so is the number and variety of soil microflora. Consequently, any of the

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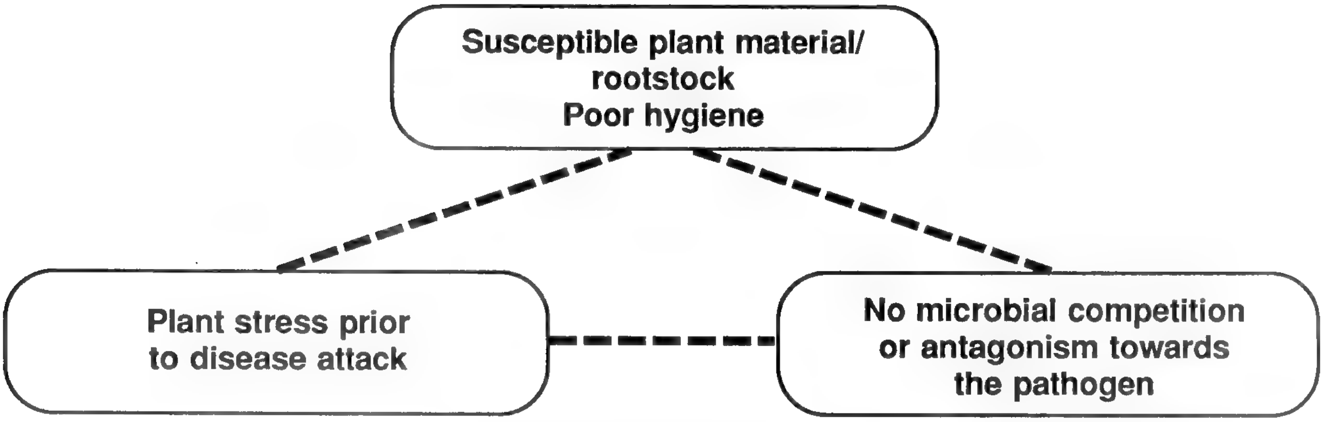
Susceptible plant material/ rootstock
Poor hygiene
Plant stress prior to disease attack
No microbial competition or antagonism towards the pathogen

The deadly triangle of disease.

microorganisms' disease resistance can also be reduced. In Western Australia, plant pathologists are assisting resistant plant species in the understories of infected forests.

Unfortunately, most types of avocados are highly susceptible to the pathogen. However, there is a rootstock available in Australia called Duke 7, which is moderately resistant to *P. cinnamomi* and can be grafted onto the popular fruiting varieties. So careful selection of rootstocks or plant varieties is important, especially in large scale agricultural systems. If you intend to grow a particular fruit or crop, it may be useful first to find out which diseases affect that plant (host), in the region. Then try to select the rootstock and cultivar most resistant to the disease(s).

Plant nutrition: The better nourished a plant is, the better it can defend itself from diseases by mustering physiological and physical defence mechanisms, of which the plant has many (see the last illustration). Well decomposed compost and other organic wastes are obvious ways to achieve good nutrition.

Other non-chemical controls include: soil sterilisation by soil solarization, soil composting, and plant heat treatments for virus control. 'Biologically-induced' resistance is another area which is now generating worldwide interest. This technique helps to prime host defences by challenging the host with a non-pathogenic, avirulent race of a pathogen before attack by a virulent strain. This technique has been successful with curcubits such as cucumbers and melons, tomatoes and sunflowers.

Chemical control

In the past 30 years, fruit and crop production around the world has been revolutionized by the use of pesticides. In America alone, the yearly consumption of pesticides has increased, during 1961 to 1981, to 212,000,000 kg for insecticides; an astonishing 78,000,000 to 381,000,000 kg for herbicides and a fall from 146,000,000 kg to 65,000,000 kg for fungicides. However, the detrimental effects of overuse are now showing. Holland is close to banning the use of lethal, broad-spectrum soil fumigants such as methyl bromide because of long-term pollution hazards in glasshouses. Many pathogens, exposed to regular and low levels of chemicals, are developing resistant or mutant strains.

Danger periods

The demands and stresses on a plant during its growth cycle may predispose it to disease. Avocados, and most fruit trees, are most vulnerable to catastrophic disease attack at blooming and fruit setting times. All the tree's resources are being diverted to satisfy its fruit set. Therefore, severe disease can drastically reduce fruit production. Large scale monocultural crop and orchard systems with few species or little genetic diversity are particularly vulnerable to epidemic diseases.

Preventive hygiene

Hygienic practices can be critical in preventing an isolated outbreak of infected plant material becoming an uncontrolled epidemic. Unfortunately, quarantine procedures for diseases like *P. cinnamomi* have come too late and it has spread throughout the continent within 80 years.

Nurseries are a major source of diseased material if their hygiene is inadequate. They can also become unwitting carriers when their bulk supplies of soil mix are contaminated with such soil-borne pathogens. The pathogen can also thrive in gravel pits and sawdust piles.

The following measures can all help limit disease outbreaks and spread: raising pots off the ground onto drainage benches, or at least having them sit on a deep bed of well-drained screenings; using footbaths of an appropriate fungicide at glasshouse entrances; properly sterilizing soil mixes in steam baths; using only decomposed organic materials in potting mixes (not sawdust: *Fusarium* or 'vascular-wilt' fungi revel in this), and supplementing potting mix with pine-bark wood chips, which release compounds toxic to many fungi (wood chips up to six months old apparently work best against pathogens like *P. cinnamomi*). If you buy soil mix or components in bulk check the reliability of the material.

It is also common for soil-borne pathogens to be spread unwittingly by council and forestry road construction.

Government

The response of governments to such diseases has varied greatly between States and with the value of the economic resource under threat. For example in Western Australia, following the devastating deaths of large tracts of virgin jarrah forests in the late 60s and early 70s, the government acted quickly and set up strict quarantine and management programs. An area suspected of a disease outbreak is placed under quarantine and all forest activities cease until the region is mapped for disease. Normal forestry operations may then resume but only under a code of logging hygiene.

Forested areas have been allocated hazard ratings and the management policy varies according to the hazard. Various management procedures have also been adopted in Victoria. In Queensland, the government has set up a voluntary nursery accreditation scheme in which participating nurseries must meet certain hygiene standards. Unfortunately, this is not a widespread practice in other States yet.

Public awareness

It is vital for the general public to become more aware of such problems and bring pressure to bear on local councils, nurseries and governments to pursue more effective management and hygiene policies.

Glossary

Pathogen: In a literal sense is 'any agent' which causes damage, but the term is generally used to denote living organisms like fungi and bacteria which attack plants. Many are parasites which derive the materials they need for growth from a living plant; OR 'a parasite that disrupts the host's physiology and metabolism to the point that disease is produced'; &/OR simply, 'an agency which incites disease'.

Spore: Minute propagative unit behaving like a seed but lacking a preformed embryo; rich in glycogen and storage materials.

Symptom: Abnormal condition of a plant.

Lesion: In general, a wound. Of disease, a localized area of infection. In plant roots, a lesion may often be denoted by an area of discoloured tissue that stains dark brown-black.

Host: A living organism harbouring a parasite.

Resistance: Resistance and susceptibility are measures of the extent to which the plant is damaged by the pathogen or, more often, the extent to which the plant prevents the entry or subsequent growth of the pathogen within its tissues. For example, high resistance resistance approaches immunity.

Solarization: Technique in which the sun's rays are used to heat the object concerned, for example soil solarization involves placing thin transparent sheets of polythene plastic on the ground for some time, and trapping the sun's radiation and heating the soil underneath.

I gratefully thank Dr H Swart for permission to use his illustration of the *P. cinnamomi* life cycle. I am also grateful to Dr H Y Yip.

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Battling in the bush

by John Wolfe

Mallacoota, Victoria.

The scene is the sunny, timbered foothills south of Traralgon, Victoria, 25 years ago when I bought a bush block of thirty acres. I did not know that the soil was unsuitable for cultivation, but I learned the hard way. Beneath the surface crust of soil was a layer of powdery clay as hard as cast iron in summer, and which turned to a sort of grey porridge in wet weather.

While I split the timber posts for the boundary fence, there was plenty of time for thinking and dreaming in that peaceful land of wallabies and sunbaking goannas. Even in my wildest flights of fancy I could not have imagined what the fates held in store for my little piece of land, which was to become the site of the monstrous Loy Yang power station.

Thousands of men would swarm over its surface. Hundreds of millions of dollars would be spent on its development. Huge buildings would rise into the sky and giant cylindrical towers would be constructed. Great palls of smoke would belch into the heavens until . . .

But wait a moment.

Let us go back to the days when my lonely crowbar thudded in the hard clay under the manna gums, and whipbirds called from the tea-tree gully. Home was a 10 foot by 12 foot shack, and I had never heard of building regulations. In those days no one worried about people building shacks in the bush, in fact, that was the accepted way to start.

The forest stretched away for miles in every direction and consisted of twisty old manna gums, peppermint and tea-tree scrub. At night I heard strange grunting noises which I thought were wild pigs. Then, one moonlit night I saw koalas gallivanting in the big but-but tree near my cabin door. These solitary and elusive little fellows made contact with each other by grunting, which could be heard a long distance away. While they slept all day, curled up in a ball in a forked branch high in the tree-tops, they were nearly impossible to see. I learned to find them by looking under the trees for the distinctive yellow droppings, shaped like a bean fishing-sinker.

At that time there was little thought for conservation or the environment. Bulldozers were only just coming into fashion for landclearing. The method used by the oldtimers in our area was to ringbark the trees and let them stand in the paddock for a few years until 'the good soaked back into the soil'. The trees were then removed by burning. At least I had enough feeling to leave the best trees for the koalas.

I owned a 'swingsaw' — one of the most dangerous contraptions ever built — and an old truck, and made a living as I cleared the land, selling firewood in the town for fifty shillings a ton. I had been employed for some time with the Forests Commission and a private forest company, but wanting to be my own boss and, disliking the ambition and tricks of the laddermen, I preferred to battle on in the bush.

If you have never seen a swingsaw, imagine a smoke-belching machine mounted on a frame, with a screaming circular saw held on a long shaft in front of the engine, with the whole vibrating contrivance mounted on wheels, and pushed or dragged around by means of a pair of handles.

The machine did not always behave. Sometimes it threw pieces of wood at me. On other occasions the teeth of the circular saw jammed or 'grabbed' in the cut, and then, anything could happen. The swingsaw suddenly became a monster of evil, bucking and leaping out of control. As it surged forward my arms would nearly be dragged out of their sockets as I clung desperately to the handgrips.

If the blade jammed in the horizontal position, the swingsaw jerked sideways, spinning the whole outfit around, sometimes giving me a blow in the stomach at the same time. When I heard how a man was cut in half by one of these machines near Stawell, I took greater care, but I still had a number of hair-raising escapes. It seemed

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Porridge Hill: 'land of the sunbaking goanna'.

that the swingsaw had a wicked brain hidden somewhere in its mechanism, and was out to get me, either by direct sudden injury or more subtly, by exposure to fatigue and oil fumes.

The old Bedford tip-truck, which I used for delivering firewood, was easier to control — once it was on the road. Getting it started was the problem: this was quite a feat on cold mornings. It was a former Melbourne City Council vehicle which I bought from a junkyard for seventy pounds. The steel tipping-tray had to be wound up by hand. To raise the tray, you stood beside the vehicle, cranking something which looked like a giant mangle. As a battered steel cable was drawn on to the winch-drum, the load rose inch by inch until the happy moment when, with a sudden roar, the firewood slipped off at the back.

It was a slow and laborious process, guaranteed effective for raising blisters and reducing weight. Eventually the winding mechanism was accidentally sheared off on a fence post. After that, the wood had to be thrown off by hand, one piece at a time. The amount of labour required seemed to be about the same as for tipping. But you got splinters instead of blisters.

It was a hard life, and some people failed to pay for their wood. Or they waited until the wood was unloaded before announcing: "I'll pay you next week!"

All firewood was supposed to be sold by volume, and it was illegal to sell wood by weight. If wood was sawn into blocks one foot long, forty cubic feet was considered to be 'one ton', although the actual weight would vary with species and degree of dryness. Thus, if blocks of wood one foot in length were made into a neat stack ten feet long and four feet high, that would comprise one ton of wood by volume. It is a lot of wood.

The wood had to be cut and stacked for one year until dry, then loaded and stacked again on the truck for measurement, carted five miles and then thrown off into someone's shed or backyard. Petrol and advertising had to be paid for. At fifty shillings a ton, I was unlikely to become rich.

The customers were given good measure. One lady complained to me: "I only ordered one ton of wood, but you delivered two tons." She didn't want to pay.

"But you only got one ton," I told her.

"The shed's nearly full!" she argued. "That's two tons when I buy it from Mr X!"

Another customer, a secondhand dealer, made a special order for wood seventeen inches long. For some reason, the size had to be exact. He insisted that the wood must be cut from old trees, be bone dry, and split to a fine size ready for burning.

To satisfy this demanding customer, I felled some old dead trees that stood in a gully and snigged them to the ridgetop for sawing and splitting. It took me two days to snig, cut and split the wood. By the time I backed the truck up to the dealer's yard, I think it had nearly cost me the quoted price in petrol. But it was a fine load of neat wood, and I was proud of it.

Then I saw that there was no access to the yard except by a narrow gate and that I had to throw the wood, piece by piece, over a high fence. At that moment the dealer emerged from his shop and waddled up to the truck. He was short and fat, and ran a critical eye over the wood. Being a dealer, I guess he couldn't resist making an attempt to beat the price down. "What's this?" he cried. "That's only whitegum rubbish."

After 25 years I can still remember my bitter disappointment. I desperately needed the money but I was not to be insulted. Saying nothing, I got back in the cabin of the truck and drove away. I delivered the wood as a gift to friends in the town, who later told me it was the best firewood they had ever burned.

One day I had the unpleasant task of sawing up logs full of scorpions and centipedes. These creatures lived in hundreds under the bark, and ran out as I worked, taking refuge in the chips and debris to the rear of the saw. Sometimes they climbed unnoticed onto my trousers, and I was stung several times by small scorpions. Whenever I felt a tickling sensation at the back of my neck, I knew another centipede was running around my shirt collar.

While I was sawing a flash of light drew my attention to a large motorcar, dazzling in the sunshine at the gate three hundred yards away. A man was already walking up the track to the little hill where I was sweating with the swingsaw. He was dressed in a suit, and carried a briefcase. The man paused on the slope and looked around at the little shack, the ancient truck and the heaps of firewood. Then he came up to where I was working.

I turned off the motor of the saw. The man started to speak. "Understand . . . firewood . . . advertising . . . shillings . . . " he said, at least that's what it sounded like to me, for the noise of the saw was still ringing in my ears.

"That's right," I agreed, hoping for an order. At the time, I thought myself lucky to sell two loads a week. But the man in the suit did not order any wood. Instead, he looked at me in a funny way, and drew a newspaper cutting from his briefcase.

"I have to inform you," he said, "that selling wood by weight is illegal, and that you are liable to prosecution under the Weights and Measures Act."

I wiped the sawdust and sweat from my face. "But I don't sell wood by weight," I objected.

The man indicated the newspaper cutting. "Is that your advertisement or not?"

I waved an arm to the surrounding trees and scrub. "I sell the wood by volume. What's wrong with that?"

"It says here," insisted my visitor, staring at his piece of paper, "two pounds ten shillings a ton delivered."

"I don't even have any scales," I said.

The man folded the newspaper cutting and put it back in his briefcase. He produced a notebook and pencil. "No scales," he repeated in a voice of doom, writing in the book. It was at about this moment that I saw a large centipede, fleeing from the bright sunlight, take refuge in one of his trouser-cuffs.

"Look out!" I cried. "There's a centipede on your trousers!" The man looked down, and immediately broke into a frantic dance, slashing at his trouser-cuffs with the notebook until the terrified centipede was dislodged.

After that, the briefcase man did not wait around any longer. I watched with some apprehension as his vehicle disappeared in a cloud of dust. A letter arrived warning of dire penalties for offences against the Weights and Measures Act. The first bureaucrat had made his presence felt at Porridge Hill.

Part two ('Porridge Hill versus the Egg Board') of John Wolfe's story will be in EG 56. Both are extracts from his forthcoming book, 'Encounters with Bureaucrats'.

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Experts in Solar power for remote houses

How to construct a solar electric control board

by Peter van der Wyk

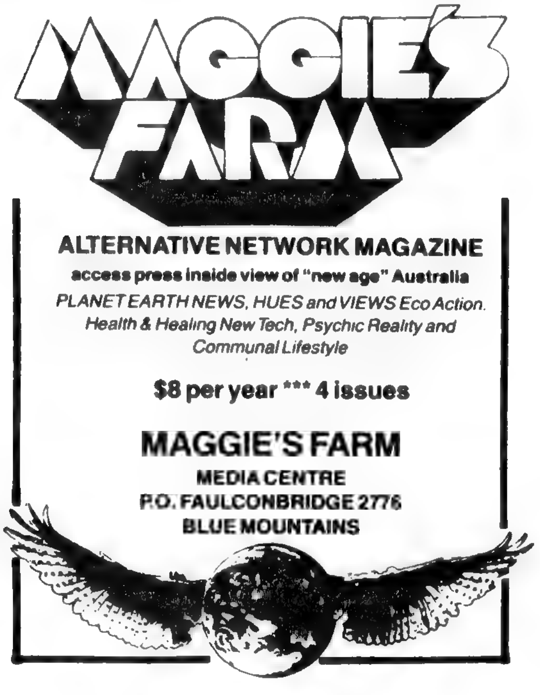
Nimbin, New South Wales.

The easiest and often cheapest way to get reliable electric power to a remote location is with a photovoltaic solar panel and an appropriate battery. You must, of course, make some kind of electrical connection between these two components. You could simply have some insulated wire going from the positive terminal on the solar panel to the positive terminal on the battery and another piece of wire between the two negatives.

From this initial connection, power systems often seem to grow quite 'organically'. More and more lights and low voltage appliances just seem to keep on appearing as if from nowhere. With each new acquisition comes the 'need' to get it functioning. And so another bit of wire gets wrapped around the battery terminal and clamped on with an alligator clip or clothes peg. Although these 'organic' power systems seem to work, they have a very high failure rate after a few months and pose a considerable fire hazard if a short occurs.

I have a few suggestions for improvements to such a system which make connections easier and more convenient and result in only one, tidy set of connections to the battery.

The battery must be located in a well ventilated, clean, uncluttered area that is out of the weather. Being exposed to moisture will cause tarnishing and poor contacts to develop on all metal surfaces of the electrical connections. A film of moisture on the battery surface will inevitably lead to some degree of self discharge of the battery. The surface of the battery must be kept clean and dry at all times.



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The central point is that connections should not all be made onto the battery terminals. There should be some point between the solar panel and the battery where all connections are made — more easily and conveniently than at the battery terminals. It is best if these connections are closer to the battery than the solar panel and that the wires from the battery are large enough to minimise voltage drop.

What I recommend to connect the various components of the system are what is known in the electrical trade as neutral links. A neutral link is a heavy duty (usually rectangular) block of brass with a series of holes through it and a set of screws that screw down into each of these holes. The neutral links that I use are the 5 hole, 7 hole, and 10 hole varieties. They usually come equipped with a plastic base and a plastic cover, available in red or black.

I use the red links for all positive connections and black links for all negative connections. The holes in the neutral links are usually numbered and it is very handy to keep a list, near the neutral link, of which wire goes to where and then to make sure that you wire up both neutral links the same way. Only one heavy duty positive and one heavy duty negative wire needs to be between this point and the battery.

The hub of the system

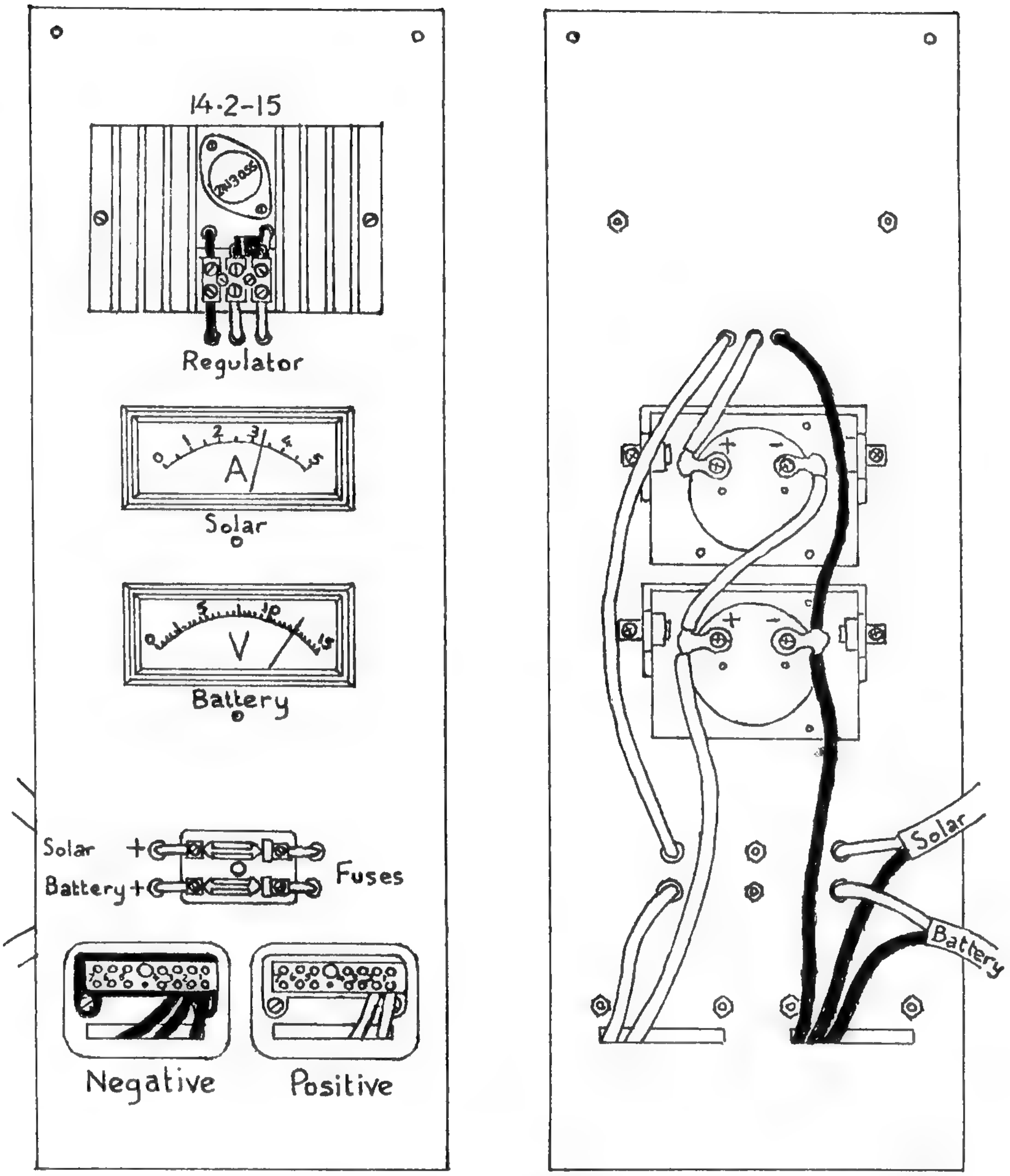
You may have your solar panel connected correctly to your battery but how do you know that it is working properly? This is where a control board comes in very useful. That set of neutral links we were talking about can be mounted on a board, along with a voltmeter, an ammeter, a fuse, a regulator and whatever else you would like to include on such a board.

The voltmeter will give you some idea of the state of charge of the battery. The ammeter will let you know at a glance how much charge is coming in from the solar panel or if in fact it is charging at all. The fuse will protect the entire system against short circuits (which could be a fire hazard). The regulator will prevent the batteries from overcharging. You could also make room for a second ammeter to tell you how much power is being used at any instant.

A control board can be as large and involved as you like but I am going to tell you about a simple board which gives only the basic essential information at a glance. You can work out the amount of current each appliance uses by the formula: Amps = Watts / Volts (if that wattage is known) or you could measure each appliance with a multimeter.

If you have some idea of how many amps are coming in from the solar panel throughout the day (which constantly varies) you could estimate how many amp-hours that amounts to (amps multiplied by hours) and then how long you can run your TV, lights or other appliances to use up the equivalent amounts of power. This is to give you some idea of how much available power you could have with a certain sized system under certain conditions. Remember that, irrespective of the size of your battery, you can never continue using more power than the amount coming into the system.

The control board, once installed, becomes the hub of the system. Everything connects to it and it tells you what is happening. Therefore, I suggest that you place the board where it is easy to see (not too distant from the battery) as you go about your daily chores.



A front and rear view of the Peter Pedals-designed solar electric control board.

What you will need

I suggest that you wire up the entire board with 4 mm or 6 mm automotive cable (because automotive cable is more flexible and easier to work with than the equivalent 240 volt type cable). Wherever you bare the ends of the cable you need to solder it to help guard against corrosion and to make a good solid connection. You cannot expect to do this with a 12 volt soldering iron (or the average 240 volt iron for that matter) because it just does not produce enough heat.

The best device for soldering the heavy cables and connections required in a 12 volt home electric system is a gas iron. You could either have a soldering tip fitted onto a pin-point burner on a small portable gas bottle or you could use a heavy iron that you can heat up on your gas stove. Soldering tips for gas bottles are readily available from gas, hardware and plumbing supplies. A roll of resin-cored solder is now required to get on with the job.

The most important connection to make is the one between the control board and the battery. This connection also needs to be made with the thickest wire of the entire system. Most deep cycle batteries have either flat terminals with a hole through which to bolt the battery connectors or dual terminals which allow for both the bolt-type connection or the standard automotive-type connection.

An easy and cheap way to make up two bolt-on type connections for the battery is with two flat pieces of copper, measuring say 2 inches by 1 inch. You now drill a hole through one end large enough for the bolt and a hole through the other end large enough for 6 mm or 10 mm auto cable. Once you know the length of cable required to go between the battery and the control board, you can strip back the insulation from the end of the cable, poke it through the hole you drilled in one of the copper strips, and solder it together.

Now that we have the wire ready to be connected to your battery we can finally discuss the subject of this article: the control board. (Don't leave both positive and negative wires connected until you have the other end of the wire connected up.)

I have made these boards with either (plywood) or perspex. Perspex is the more weather resistant but also more difficult to work with (although the control board shouldn't really be exposed to the elements anyway). My preferred layout for the control board is to have the shunt regulator (see EG 51, p 40) at the top of the board with the amp and volt meters below that, the fuse box below the meters and the positive and negative neutral links side by side at the bottom of the board.

You must choose the amp and voltage range for your meters. Remember that a 12 volt battery will rise up to about 15 volts during charge (when it's fully charged). Tandy stores have quite a good voltmeter and Dick Smiths stock 5 amp and 10 amp meters. Blue Ridge Solar in Murwillumbah have quite a range of good quality meters. With the meters from Blue Ridge you need to get separately the solder lugs that screw onto the connectors. A neat fuse holder to use is a car-type double fuse holder made by Hella.

Assembling the board

Now that we have all the bits and pieces together we can work out how big the board needs to be and its exact layout. The regulator, fuse box and neutral links are easy to mount: all they need are some 1/8th inch holes drilled in the right places and then bolted on with 1/8th inch nuts and bolts. You also need larger holes for the wires to come through to the front of the board from the back (see illustration).

Under the neutral links and close enough to the brass strips to be covered by the neutral link cover I make a slot for all the wires to come through. If you haven't got a jig saw you can saw out between drill holes with a broken piece of hand-held hacksaw blade.

If you need to cut round holes for the meters you could use a hole saw in an electric drill but if you need rectangular holes for meters such as the ones sold by Blue Ridge Solar you will either have to repeat the hacksaw trick or use a jig saw.

Once we have all the pieces on the board we can begin wiring it up. I use the double fuse holder on the board so one of the connectors on the fuse box can be the positive battery connection and the other can be the positive solar panel connection. All the negatives and all other positives can then be connected directly to the neutral links.

So this board then becomes the heart of the system to which the rest of the house can be wired up.

I don't think I need to give you any more detail here about wiring it all up other than following the diagram. Make sure all the ends of your wires are soldered, and happy tinkering.

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Some thoughts on solar retailing

by Greg Baker

Braidwood, New South Wales.

I was interested to read Stephen Ingrouille's article in *Earth Garden* 53 and his comments on our solar refrigeration troubles (EG 52).

We live near Braidwood, NSW, which is not large enough to support a solar retailer. Our nearest large centre of population is Canberra — Queanbeyan. While it certainly has solar equipment and accessories retailers, the prices tend to reflect the relative affluence of the area. Also, the solar people tend to be aiming at a slightly different market to that which I, and many EG readers, belong. Canberra retailers tend to promote top of the range and expensive complete systems rather than the 'build it up yourself from scratch' systems which I, and no doubt many EG readers, favour.

Hence, we tend to look further afield not only for a good price, but also for someone who seems to care and actually offer practical advice. I wish Stephen was within a reasonable distance of here! If we can't get advice we feel we can trust we make our decisions on the information we have available and can glean from such places as *Earth Garden*. Then we shop on price.

In the case of the solar refrigerator, there appeared to be only four choices. The Solarex refrigerator had all the features that we wanted but was very expensive at $1500. There was no way we could justify that sort of outlay. The Technica was cheaper but a dreadful shape and a bit small at only 140 litres. The Trailblaza from Norcoast Discount Refrigeration in Queensland was a beautiful sturdy unit, but again the $825 for only 60 litres was an obstacle.

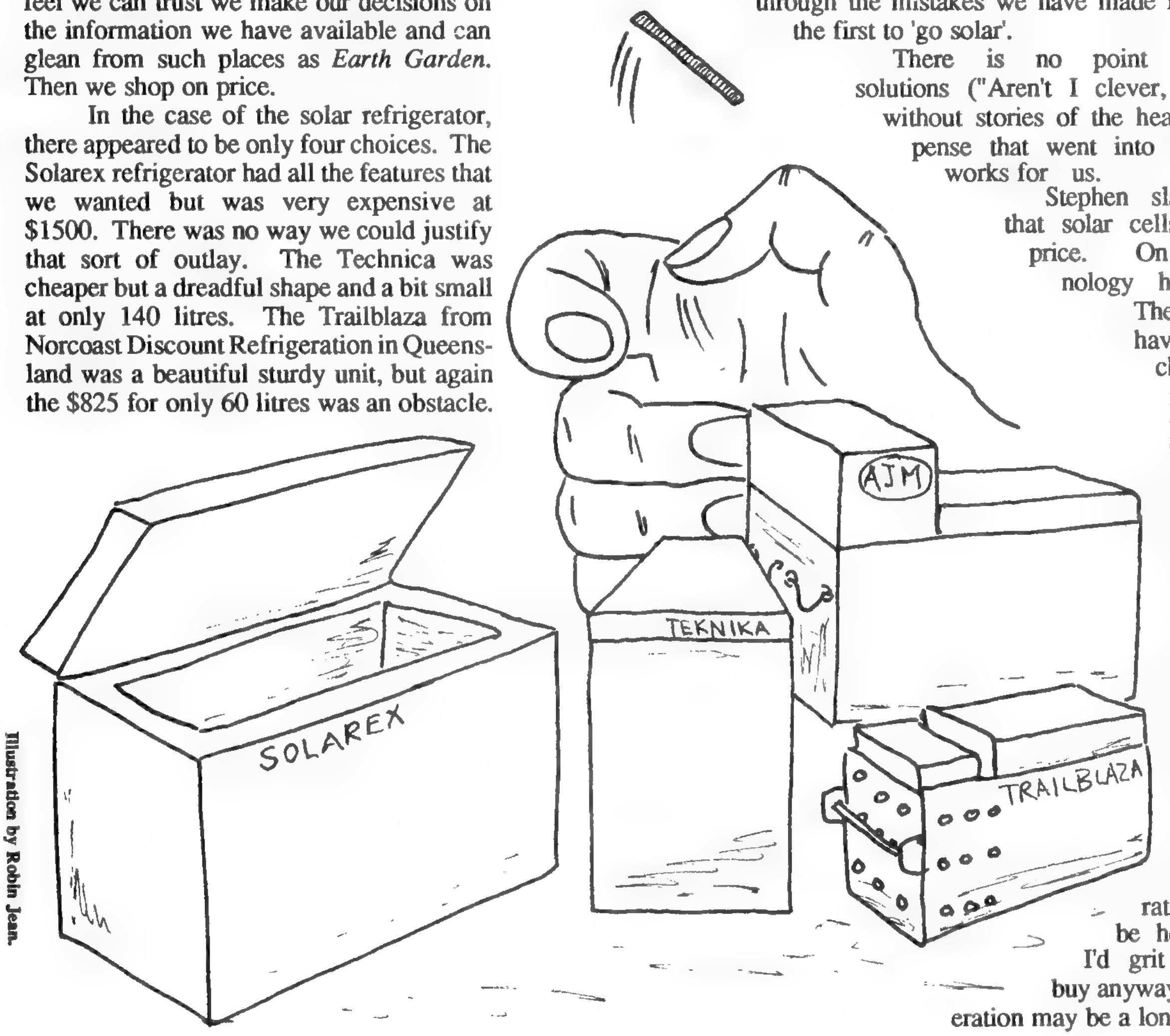


Illustration by Robin Jean.

And there was the AJM refrigerator and freezer from IPS in Sydney. When we first started looking, we were quoted $825 from a Canberra retailer, but when we were ready to buy, the cheapest was $1200 for the refrigerator and $1087 for the freezer from IPS. Now, all the above fridges appeared to have the same unit but different cases. For size and price, the AJM seemed the best choice.

When we discovered that AJM would sell direct to us we were delighted. The unit we bought would have cost $1200 from IPS in Sydney (who would never have handled the unit if we had bought there, collecting many dollars for a couple of telephone calls) or $700 from AJM in Bendigo. To us there was no choice but to buy direct from AJM.

When things go wrong, as they did with the refrigerator and freezer, my first action is to approach the retailer or manufacturer. But if, as it turned out with AJM, my mental watchdog says not to trust them, then I am forced to make do with the situation as it is and do my best to pass on my experiences to others. Indeed, my motivation in many of my EG pieces has been to go through the mistakes we have made in being among the first to 'go solar'.

There is no point in presenting solutions ("Aren't I clever, I've done x") without stories of the heartaches and expense that went into a solution that works for us.

Stephen slams the myth that solar cells will drop in price. On today's technology he is right. The latest price I have on the cheapest panels is about $11.50 per peak watt. This is more than a couple of years ago ($9.50 per peak watt). The early drops, even with inflation, seem to have ended. Prices will continue rising with labour and materials costs and the weak dollar. Perhaps a new generation of cells will be here shortly, but I'd grit my teeth and buy anyway. The next generation may be a long time coming.

Build a baby's cradle

by Alan Thomas

For years I had always thought of an old-fashioned cradle as a far more romantic bed for a child than any modern contraption. When I looked around for designs in woodwork books I found very little to inspire me, so, because I was determined that our son, Tane, was going to sleep in a cradle, I had to design it myself. The cradle was finished just in time — Tane arrived three weeks early so I didn't get a chance to turn the corner posts on a lathe.

Cradles can be functional as well. Tane's cradle was designed so that when he was going to sleep and we were doing something (like reading, writing or knitting) the rockers allowed us 'hands-free operation'. The end of each rocker is close to the ground and is flat on top. This is so you can rock the cradle with your foot while your heel rests on the ground. The knob on the bottom end of the rocker is like a brake — if the baby rolls around or tries to climb out the cradle will only tip as far as the knob.

The cradle was larger than usual so that it would get plenty of use. In fact, Tane slept in it every night till he was 15 months old — almost to the day Camille finished breast feeding him (I think he could have easily kept sleeping in the cradle until he was two years old).

I used oregon to build the cradle, with lengths of 1/2 inch dowel along the sides. Oregon is sturdy, stains well and is a lovely timber to work with — I think of it as a 'hard softwood'. To make this cradle you can cut the timber (about $30 worth) from the following lengths:

- 1.5m long, 85mm wide, 40mm thick (the two rockers),
- 1.5m long, 100mm wide, 25 mm thick (three top rails),
- 500mm long, 300mm wide, 25mm thick (the top plate),
- 2.0m long, 40mm wide, 25mm thick (the bottom rails),
- 2.0m long, 35mm wide, 35mm thick (the four posts),
- 8.0m of 12mm dowel,
- 4.0m long, 90mm wide, 12mm thick pine (for slats).

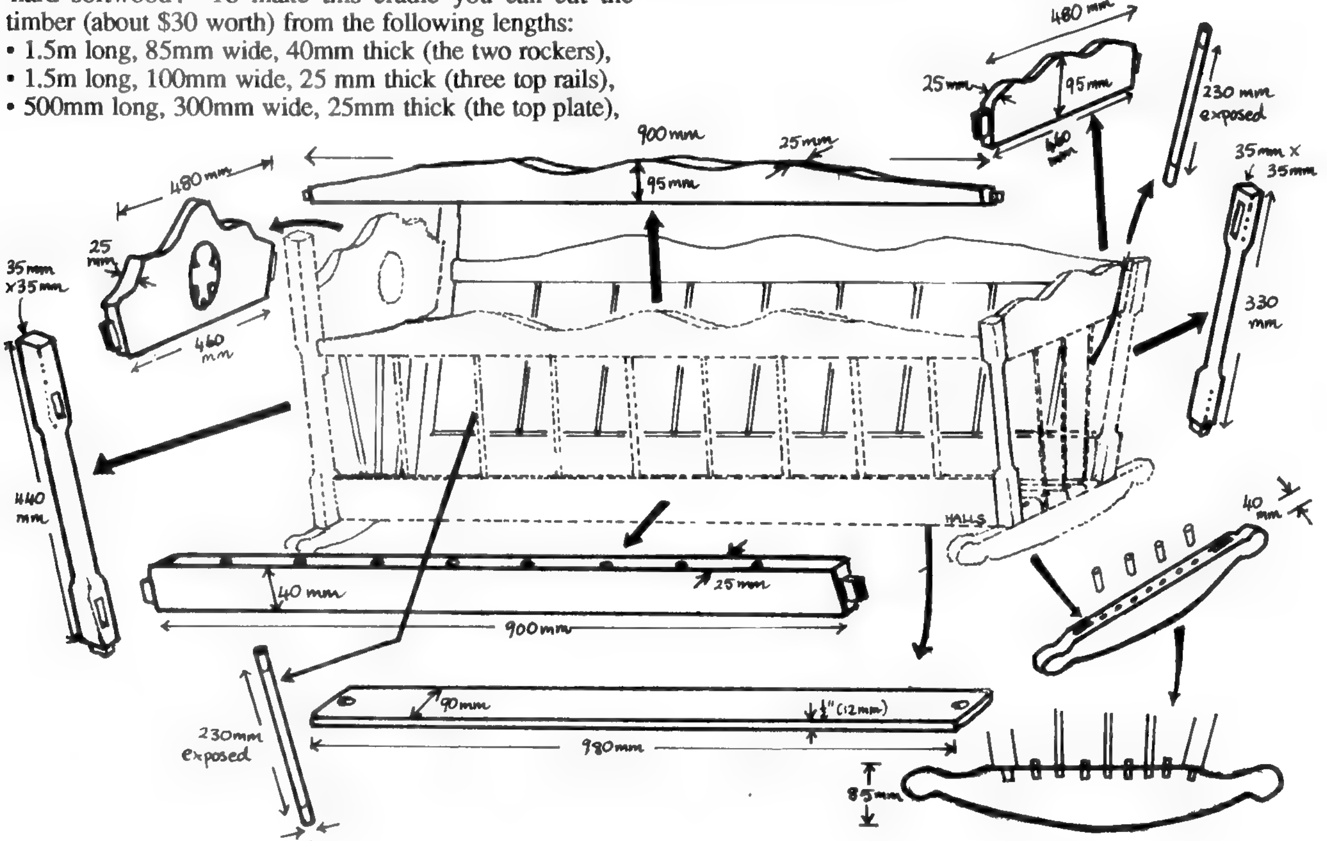
There is nothing complex about assembly once the pieces have been cut to shape. The cradle is all tongue and groove joints with wood glue, and there isn't a nail in it. The grooves for the dowel can be drilled 25 mm deep and the grooves in all other joints are 15 mm deep. The easiest way to assemble the cradle is to glue the top and bottom plates (or rockers) onto the dowel strips on the four sides, so you end up with four 'walls'. Then the 'walls' are joined to the corner posts and the slats attached.

I found the hardest part was getting the rocker shape symmetrical (a paper pattern folded in half to form a mirror image is handy here). I was lucky enough to borrow a jig saw. Apart from that, all you need is a saw, a good set of chisels, a drill, files, sandpaper and varnish.

The base slats should have plenty of air gaps for ventilation so that moisture isn't retained on the base. I also made the slats removable.

When I was designing the cradle I was paranoid about cot death: someone told me their pet theory was that there wasn't enough air flow around the babies — so you can see I allowed for plenty of air flow through the sides!

The mattress we used was a pillow case filled with tea-tree bark shavings. There are also other non-synthetic mattress materials available.



An exploded view of the cradle, showing the dimensions and individual parts.

Thyme: for any garden

"I know a bank whereon the wild thyme blows"

— a favourite line from Shakespeare's *A Midsummer Night's Dream.*

by Liz Sinnamon

'Elizabeth Herbs' farm, Nambour, Queensland.

Thyme is a beautiful herb, popular throughout the ages and useful both as a culinary herb and an invaluable medicine. Garden thyme and lemon thyme are the most popular and well known of its many, easy to grow, varieties.

Garden thyme has very small greyish-green leaves which are joined to thin stalks projecting in an angular fashion from hard woody stems which form an erect bushy plant 30 cm (12 in) high. Flowers are pinkish white and appear in spring at the tips of the branches.

Lemon thyme has slightly larger and greener leaves, and the spring-blooming flowers are deep pink. It has a spreading habit and only grows 15 cm (6 in) high. When the foliage is crushed it releases an unmistakeable lemon fragrance, giving it a subtle flavour when added to food.

Thyme is a native of Mediterranean lands, happy in fairly poor soil in a dry hot position in the garden, although well rotted manure or compost will keep the plants healthy and growing well.

You can grow garden thyme from seed but the small seedlings grow slowly, and it takes considerable time to establish a small clump. Propagating by root division is simple and easy and the plants grow quickly to maturity. New plants can be planted out in the spring.

Thyme also grows well from tip cuttings — simply place the cuttings in a pot of sand and keep watered. Good root systems will grow quickly and once established can be easily separated and planted out in the herb garden.

For drying, harvest the leafy branches just before they start to flower. For fullest flavour, gather them on a dry day before midday. Hang them upside down in bunches in a shady, airy place and when they're crisp-dry, strip off the leaves and store in airtight containers. Washed and dried sprays of thyme can also be sealed in foil and frozen whole for several weeks.

Culinary uses

The special fragrance of thyme can be blended with other herbs such as parsley, marjoram, and a bay leaf to enhance the flavour of many dishes. Use in casseroles, stews, stuffings, tasty sauces and paté. It tastes wonderful in herb bread, added to eggplant, zucchini, marrow, tomatoes, haricot and lima beans, onions and beetroot. Thyme gives a subtle and delicious flavour to fairly bland vegetables and lentils, making it invaluable for vegetarians.

Medicinal

Lemon thyme: ***Thymus citriodorus.***

Thyme absorbs sunlight which it converts into potent volatile oils, containing substances that make this herb a valuable medicine for treating coughs, colds, cramps, colic, poor digestion and loss of appetite. The plant also has antiseptic qualities, and is recommended for relieving headaches, bowel and bladder disorders, as a nerve tonic, and for toning up the reproductive system. It is said to improve the eyesight. An effective gargle for sore throats is sage and thyme mixed together in equal quantities.

* * * * *

Thyme medicine for sore throat, coughs and colds*. Pound a quantity of dried thyme leaves, (approximately 28 grams {1 oz}) to a fairly coarse powder. Add to this 84 grams (3 ozs) of clarified honey, and mix well. Store in an airtight container. Take one tablespoon three times daily. To clarify honey, bring it to the boil in a small saucepan until scrum rises to the top. Skim thoroughly, and allow to cool.

* * * * *

Because thyme is one of the most aromatic of all herbs, it is invaluable as a companion plant. It helps to repel cabbage root fly, attracts bees, and has a beneficial effect on most garden plants.

Your garden wouldn't be complete without this helpful and lovely herb.

**rewritten from a prescription from Culpeppers Complete Herbal.*

Another bio-dynamic farm is flourishing

by Graham Roberts

Giant's Creek, New South Wales.

Our first story was printed in *Earth Garden* 43 three years ago. Readers may be interested to know what progress we've made since then — we know that encouragement is important when you're pursuing an ideal.

Our property, 'Swallowfields', is a way of life that started in 1980 during the terrible drought years. My son Matt and I began by buying 200 acres of land in a valley surrounded by wooded hills and thousands of acres of Crown land and national parks, north-west of the township of Denman in the beautiful Hunter Valley.

Our main aim has been to develop a self-supporting organic farm by breeding a stud herd of Poll Hereford cattle (see EG 49). We have done this by buying a foundation herd of females from a stud at Baldry, NSW, and breeding, using selected sires to give us the type of progeny we want.

The stud, called Beau Ideal Poll Hereford Stud, is potentially our main source of income so we are developing our land to sustain a healthy herd of cattle during all seasons. Consequently, no agro-chemicals have ever been used — not even insecticides in spray cans. We rely on the spider webs to catch the flies, much to the dismay of some North Shore relations.

We believe there are many years of work ahead of us if we want to fulfill our aims, although over the past eight years we have achieved a lot. We have built a house of stone and erected fences, cattle yards, sheds, sunk wells, built dams, developed a good vegie garden, established a vineyard and other fruit trees, herb garden and planted many native and ornamental trees.

Soil

Our biggest job has been to improve the soil fertility and because we use the Keyline method of cultivation we have been continuously chisel ploughing over most of our paddocks after every rainfall or when the ground is 'ready'.

Approximately 100 acres of paddocks have been changed from poor compacted infertile soil, due to many years of tramping stock, to moderately fertile soil — light in humus but still quite acid. Recent soil tests gave a ph reading of 4.9 but our experts, Mineral Research and Development Pty Ltd, recommend that the area be given dolomite with added trace elements. We hope to do this by the end of the year and at the same time we will seed with white clover, Woomera rye grass, oats and woolypod vetch. We have some small alluvial flats along the creek and these will be sown to lucerne as a permanent forage crop.

Our stud cattle are now showing signs of better nutrition — the calves are growing quicker and cows are retaining their condition longer. We haven't increased stock numbers yet so we still run about 40 cows with calves at foot. We think we can increase this number to 100 breeding cows in a few years as the pasture becomes more productive and by the use of cereal forage crops.

Vineyard

Our vineyard has suffered somewhat over the past year because it has been very dry and we just couldn't keep the water up to the young vines. However, this summer has been the best for years — we have had frequent rainfall so the strongest vines are growing well. We will take cuttings of these and fill the gaps left by dead vines.

We have begun trellising the vines and have run our wires 1350 mm from the ground. We are not interested in mechanical pickers and feel the extra height might be better for keeping the late frosts from affecting the new buds each spring. The other advantage is that by having the vines slightly higher than usual, it makes it easier for picking and pruning.

I did try grazing geese in the vineyard to keep the grass and dock down and also to add valuable manure to the ground. I'm sure grazing geese is advantageous but I must find a way to stop the foxes getting at them. Foxes tend to attack in spring when the geese are nesting. I lost 15 in one night last year so I won't replace them until I can be sure of offering them safety by building better nesting boxes.

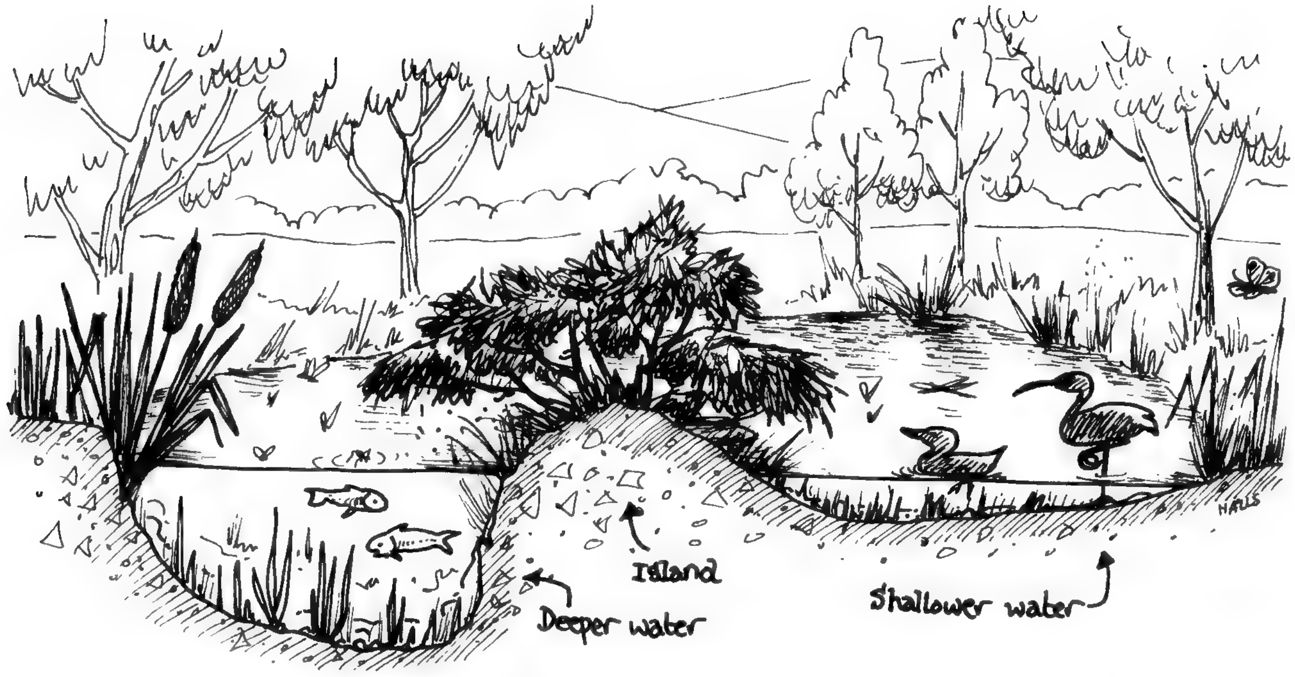
Dam

Another major project has been building a very large dam. The surface area when the dam is filled will be about three acres. We designed the dam so that there are deep areas, shallow areas, islands and safe nesting areas.

Water birds have three major requirements, water, food and shelter. Water birds around here are waterfowl (ducks) and long legged shallow-water wading birds (egrets, ibis, herons and spoonbills). Each bird has its own needs so the greater the variety of water depths and food available the greater the number of birds we hope to attract to the dam.

In a dam, shallow water is the most important source of food for waterbirds. Where water is less than one metre deep, plenty of light and warmth encourage the growth of aquatic plants. The birds eat these and the insects on and near them. Shallow areas also support rushes and reeds which provide some food, shelter and nesting sites plus building materials for other species.

The deeper water is used by the diving species



The dams at Swallowfields, when completed, will be part of an intricate ecosystem.

feeding on fish or plants which grow on the dam floor. In a natural swamp or wetland there is a seasonal change in water levels. As water levels rise and fall new sources of food become available and more birds can use the area than if the water level stays static. We will use the dam for irrigation so we hope this rise and fall can be simulated by having a drop in water level in summer and a rise by late winter.

We have provided trees around the dam because ducks and small birds will need shelter and as soon as the island is safe from stock we intend to grow species of paperbark (melaleuca), bottle brush (callestemon) and tea tree (leptaspermum) which are adaptable to this area.

We intend to fence off the dam from stock so they will not trample the edges and eat all the ground cover. We hope this will stop soil erosion and allow the dam to hold reasonably clean water. We intend to stock the dam with fish but will be advised by the State Fisheries Department on the best species.

The dam has been a major project for us this year and we feel that if our design has been appropriate and we manage the dam carefully it can have many uses. We are interested in stock water, irrigation, domestic water in emergencies, fish rearing, erosion control, wildlife sanctuary, and most important, aesthetic appeal.

We believe that improvements made for one purpose have ongoing benefits. Trees near the dam provide nesting sites and stock shade as well as reducing water loss from evaporation. Rushes and other swamp vegetation protect the dam edges and wall from wave action and erosion, give shelter and nesting material for birds (who will control insects on our paddocks) and can also be used for emergency grazing.

Sitting under a lovely shady tree fishing or bird watching are other advantages our new dam can offer, so all we need now is lots of rain to keep it filled up.

We have an ongoing plan to build more dams at 'Swallowfields' as this is all part of our Keyline strategy. The next dam will be in a primary valley and will have a lock-pipe system for flood irrigation. This dam will link up with the first dam and the water will reticulate from one to the next after flooding across a 20 acre paddock which is to be contour chisel ploughed and sown with cereal forage crops.

We are encompassing the Rudolf Steiner philosophy at 'Swallowfields' because we consider bio-dynamic agriculture a great challenge in Australia*.

Comfrey

I am interested in growing comfrey as a forage crop and have read of people (such as Vernon Stephenson of Hunsley Horse Stud in Yorkshire) feeding race horses on comfrey for forty years with success. A Mr Elmar Jeskey of Aurora, Oregon, USA, has six acres of comfrey as a supplement to pasture for bullocks. His cattle gained an extra 100 lbs per beast at eight months old. In Kenya, Mr John McInnes used cut comfrey as his standard fodder for his Jersey herd in an area where there is very little grazing in the dry season. He is quoted as saying, "Comfrey kept two cows in milk where one starved before."

I have some plants that I am propagating but am interested to hear from anyone who has done some work in this field or has a supply of comfrey plants for sale.

**If anyone near us is interested they might like to contact us so we can exchange ideas and if enough people are interested we could organise field days here at 'Swallowfields'.*

Comfrey (*Symphytum officinalas*), also called Russian comfrey, is a vigorous, easily grown plant which can be propagated from root cuttings. Although the leaf is credited with possessing all sorts of healing virtues (we are experimenting on our animals as well as ourselves), it is actually the root which should be used. The rhizome contains an abundance of *allantoin* in the spring but scarcely any during the summer months. An extract of the root — 60 grams dried, powdered and infused in 500 ml of boiling water for 20 minutes — will heal ulcers and sores.

I have also read where the young leaf eaten raw is a cure for asthma. We use comfrey leaves in our compost heap and this helps speed decomposition.

The leaves apparently contain a toxic alkaloid known as pyrrolidine, and if this is so then it would be unwise to use it exclusively in large quantities for stock or humans.

However, in a book written by Lawrence D Wills titled 'Comfrey — Past, Present and Future', Appendix 1, the alkaloid content of comfrey by Dr D B Long PhD, MA, concludes: "Thus from these experiments and other considerations it may be concluded that the use of comfrey as a food for humans or animals does not present a toxic hazard from alkaloids, there being no evidence of acute or chronic hepatic reactions either to the direct injection of purified alkaloid or to a prolonged consumption of comfrey root flour, which has the highest alkaloid content by ratio.

"From this and the much lower content of alkaloid in herbage and tea, together with the lack of any toxic evidence in livestock and the very low level of toxicity of the alkaloid itself, it may be concluded there is no toxic hazard from the use of comfrey herbage and tea."

I think that comfrey is a miracle plant and we intend to keep on trying its worth.

Comfrey ointment

This ointment should be made from the root of the plant, not the leaves. Dig the roots during the spring months — this is when the allantoin, or healing principle, is at its highest concentration in the plant. Scrub several pieces of the root. Trim off the small pieces and replant them. Each will grow into a new plant.

Slice the root finely, place in a bowl standing in a saucepan of hot water and add enough lard to cover the root when melted. Keep the water simmering for a couple of hours. Remove the bowl and strain the hot liquid through a cloth into screw-capped jars.

Label and keep in a cool place or the fridge, or the lard may go rancid. In hot climates use benzoinated lard, which will not turn rancid.

* * * * *

It is a relief to have the cooler weather now because the country has been very dry this summer. We started planting our winter crops in March as this was the time we expected some rain. We also gathered dead wood from the paddocks for our fuel supply for the cold winter upon us.

Weave your own safari helmet

by Jose Robinson

Wild Cattle Island, Queensland.

Grasses are a versatile and interesting medium to work with. For coiled weaving work, choose a type of grass which has a fibrous feel to it. *Imperata Cylindrica* (bladey grass), which grows almost anywhere in Australia, is excellent for weaving. Xanthorrhoea (known as grass trees or black-boys) are also good to work with.

Walk along some out-of-town roads or near beaches, and you'll find an abundance of natural materials available there, just waiting to be harvested.

The coiled technique is quite simple to learn, and once you've mastered easy shapes such as small bowls, you may then adapt your articles to suit your materials. There are endless creative possibilities to explore, both with textures and shapes.

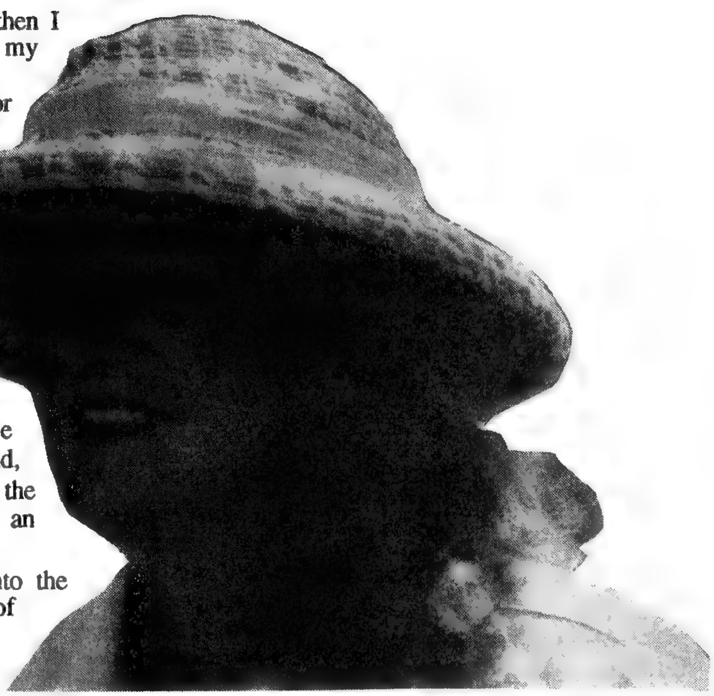
You will find that the green colour of the grass soon fades to a neutral creamy colour, similar to the natural colour of the raffia which is used as the binder. A final coat of clear varnish makes the hat firm and durable.

Coil work is a craft which has been practised by many races through the ages. The materials vary with the climate of the country of origin. Various grasses and fibrous roots are most commonly used in cold countries, while palm leaves and raffia (the tough underneath part of the leaves of the raffia palm) are used in warmer climates.

A variety of stitches may be used in this work, but the method of making the article is always the same. The beginning coil is bound, and coiled on itself. As each coil is made, it is fastened to the one below, by regularly placed stitches. The coils continue in the round, until the desired size or shape is reached.

I use glove-stitch in all my grass work. Glove-stitch is formed by taking one stitch over a bundle of grass in the round, and into the stitch in the previous row below it. Repeat again into the same stitch. Glove-stitch forms a little 'V' shape pattern, fanning out from the base as the rows progress.

Grasses may be used fresh and green, but must be worked very closely and tightly so that when the sap goes out as the grass dies, no loose spaces form in the work. Dried grasses must be picked green and stored between layers of newspaper so as not to mildew. Then when you are ready to work the grass, it must be soaked in hot water for at least 20 minutes before use.



I prefer to work with freshly picked grass but then I have the advantage of collecting it only metres from my home. It's always there fresh and ready when I need it.

To begin with, make a few small simple bowls or containers before you try making the helmet pictured being modelled at 'stage right'.

Method for helmet

Beginning with the centre top of the crown, take a bundle of four or five lengths of grass and wrap one end of the bundle around the index finger of your left hand. When you've made a tight little circle of, say, twice around, slip it off your finger and bind with a length of natural coloured raffia. Now you are ready to begin your first coil. Thread the loose end of raffia through the eye of a large needle and, with a couple of stitches, secure the bind. Now coil the bundle of grass around the bind — this should form an oval shape.

From now on for each coil, work the raffia into the previous row in a glove-stitch, adding a couple of lengths of grass regularly at staggered positions as you work. The number of grass strands used to form the coil depends on the type of grass you are working with. I find that I need about six strands if I am using bladey grass.

If you don't have a milliner's head mould or a wig stand to out try your woven head shape use your own head as a mould. Try the shape on frequently as your work on the crown progresses. A safari helmet is usually made quite a bit larger than your head size, because they are not meant to sit close to the head. When completed it should be quite loose, and it is the wide elasticised inner head-band which keeps the helmet in position. Helmets are designed for coolness with plenty of air circulation space available to dissipate perspiration and body heat.

When you reach the desired crown depth, the next coiled row must sit almost at right angles to the crown. This forms the start of the brim. To begin this right angled row, the bundle of grass to coil is placed beside the previous row, rather than below it as before. Work now in this manner outwards until you reach the desired brim width (approximately 7.5 cm or three inches for the average head).

You are now ready for the narrow turn-under of the edge of the brim. Work two rows at right angles down from the brim edge, keeping the work fairly tight. End off by tucking the finishing end of grass under the previous row, and glove-stitch twice into the one stitch. Cut off the ends.

Varnishing

The hat may be varnished immediately while it's still green, or left for a couple of weeks until the grass has turned to a neutral colour. One coat of clear varnish brushed on thinly both inside and outside the helmet is ample. When dry it becomes stiff and firm, and will outlast many of the hats which are commercially mass-produced.

Inside headband

Take a strip of white cotton material six cm wide and long enough to go around the inside of the crown. It is better if the fabric has a selvage (will not unravel) on one side. The other side can be hemmed on the sewing machine with a hem large enough for white round hat elastic to be threaded through it. Sew the selvage edge by hand with a running tack stitch neatly inside the hat where the crown joins the brim. Draw the elastic through the inner edge and tie it off firmly. This elastic holds the helmet firmly but so that it doesn't feel too tight when you're out in the sun.

Chin strap

Cut two narrow lengths of brown, very thin leather or vinyl long enough to go under your chin, and join the pieces together with a suitable small buckle for adjusting. Sew together each end between the head lining and the helmet. When the chin strap is not in use, or not required, it may be buckled over the top of the front of the brim.

Pugaree

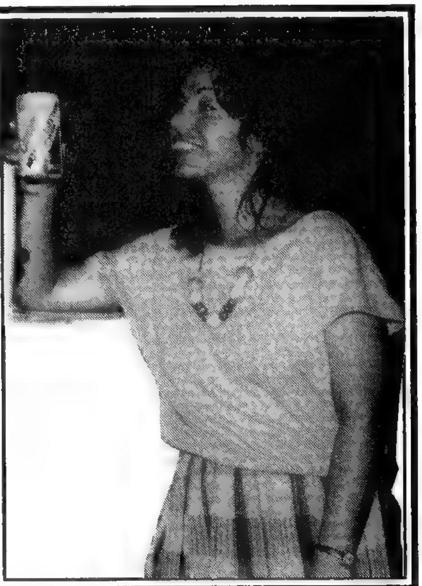
This is the outside hat band. I use khaki stretch fabric approximately eight cm wide and long enough to fit slightly stretched around the hat. Sew the ends together to form a circle, then pleat down in a 'V' shape both front and back, and hand sew in one or two places around the crown.

Don your safari suit and boots — you are now ready to depart for the jungle.

EARTH GARDEN REVIEWS

Edited by Sophie Masson

This issue we begin a regular book review column, prepared by *Earth Garden* contributor, Sophie Masson. Accurate, reliable books can be an invaluable aid to those setting out on an *Earth Garden* path as well as to those readers firmly established in EG lifestyles. We will be pointing out not only books which are of purely practical value but also those which are simply interesting, and may not be publicised elsewhere.



How to make the most of your tractor

Introduced by Professor Brian May

Intermediate Technology Publications

Distributed by Second Back Row Press. RRP $18.00.

The Intermediate Technology Group is an organisation developed by 'Small is Beautiful' author, E A Schumacher, and its aims are to bring technology information, at an appropriate level, to the Third World. Their publications department has a number of interesting titles for Earth Gardeners, ranging over a wide variety of self sufficiency topics. Although the books are aimed at Third World farmers and communities they are often applicable to Australian conditions. Such a book is their recent one: How To Make The Most Of Your Tractor.

There are many people who have just moved onto the land, bought an old tractor, and are not too sure how to look after it, run it, or get the most out of their useful beast. This book fills the gap, and does not assume any prior knowledge of tractors or the many points which must be considered when using them. The safety section is important reading, and the long section on careful maintenance of your machine is also very clear and important.

But it's not only maintenance and servicing which are clearly covered here. Basic tractor techniques are also covered, and all the information is clear and well presented, with lots of explanatory diagrams. For novices and experienced people alike, this book will be useful to keep under the tractor seat.

Community Enterprises — a legal and commercial guide

by Glen Mcleod

Published by the Appropriate Technology Group, Western Australia.

Community enterprises or businesses are becoming attractive propositions in a time of high unemployment and declining communities. They are not a new idea by any means: in Europe and Northern America community enterprises have flourished, sometimes for hundreds of years.

Today they seem particularly appropriate, especially for people espousing alternative ideals, seeking to break down the often destructive ethos of individual business.

It's not only 'alternatives' who are exploring the concept of community enterprises: many communities are initiating such enterprises with help from government projects and funds, or support from organisations such as Rotary. However, a bright idea for a community enterprise is not enough — there are umpteen factors tied up with their organisation which people starting out may not realise.

This little guide is invaluable for those wishing to launch such ventures, and explains commercial and legal terms and practices, as well as having a good glossary, an example of community enterprises, and a number of chapters of advice on matters such as torts, tax and trusts. Although some of the legal information is only accurate for Western Australia (such as The Companies Code) most of the guide applies throughout Austral ia.

The author, Glen MacLeod, is a Perth barrister and solicitor who has advised and worked for community enterprises. The Appropriate Technology Group is a non-profit community organisation which operates an important technology information network and is involved in a number of community projects, such as training programs for unemployed people.

Natural Beauty

by Lorna Horrocks

Published by Angus and Robertson $17.95 (hardback).

The cosmetic counters of department stores are full of expensive, well-packaged concoctions which make extravagant promises on condition you shell out a small fortune.

Many people are getting fed up with paying through the nose for products which are expensive, chock full of chemicals, and often use animals in both their production and development.

Natural Beauty is for such people, and gives a wide variety of useful advice, information and recipes on how you can use natural ingredients to look after your body.

But beauty is not only skin-deep, and along with the yummy beauty recipes, there's also advice on diet, exercise and relaxation. Lorna Horrocks uses quotes and references to back up her advice, and many of these are fascinating.

All the beauty recipes are easily put together, and are so interesting that they could even lead to a cottage industry. The book is well illustrated with beautiful pen drawings and delicate watercolours. An ABC of herbs used in the book is provided in the final chapter.

The New Zealand-born author has been interested in natural beauty care for many years and has experimented widely. She conducts herbal lecture courses and has operated a unique shop and consultancy called 'The Compleat Herbalist' as well as writing articles on herbs for many different magazines.

South African women on the move

by the Vukani Makhosikazi Collective, Johannesburg.

Published in Australia by Plito Press, $11.96 (paperback).

The South African apartheid regime is one of the greatest of modern injustices. We've all heard about it and the life it imposes on the black majority of this divided country.

But sometimes the newspaper reports, the radio, and television pictures don't tell all the story. Sometimes you need a book like this to grasp what being black in South Africa really means.

The women in this book are ordinary working women in a variety of circumstances — domestic servants in the cities, beasts of burden on farms in the backblocks. Their stories are bleak, and to the average western woman, horrifying. They tell stories of separation from children and menfolk, of family relationships broken up because of white rules, of exploitation of the crudest kind, and despite all this, of quiet resignation, superb spirit, and often, heroism.

Many South African women are prepared to accept any job rather than see their children starve. In a country where there is no social welfare, least of all for blacks, if you don't have a job, you starve — quite literally.

The women suffer from the double disadvantage of being black and female, and they are the most oppressed of South Africa's labour force. The Johannesburg collective who put this book together are members of various organisations fighting for black rights in South Africa and are black, white, and 'coloured' women.

Their name means 'Wake up women' and the final chapter offers some hope for the women of South Africa — based on multiracial relations, social justice and a full part in running the country's affairs.

The Australian Family Vegetarian Cookbook

by Helen Stephens

Published by Hyland House Publishing, RRP $12.95.

More and more Australians are turning to a vegetarian, wholefoods diet for many reasons, including to avoid the diet-triggered illnesses so many of us are prone to. Even inveterate meat-eaters can enjoy the variety of good vegetarian food presented in this book. Unless they've been accustomed to it from the start, children often seem to be the hardest to convince of the benefits of vegetarian cooking. Most of us know that vegetarian food need not be of the 'brown rice, lentils and other rabbit food' variety that some people seem to think it is. This book by Helen Stehens joins a long line of cook books which aim to make a vegetarian diet fun and tasty for people who want inspiration.

Before the book gets into the recipes it discusses a few important points: some philosophy, protein and how to get kids to eat unloved foods (a very handy chapter if you have a strong-willed refusenik in your family!).

The recipes are divided into main meals and vegetable dishes, more sophistocated main meals, 26 more ideas for main meals, sauces and dressings, finger food meals, soups, breads and pastries, desserts, cakes, cookies and party treats, quick and easy bottles and preserves, and breakfasts (including a delicious muesli). The recipes use a bewildering variety of ingredients. If you grow your own fruit and vegetables the benefits are twofold, but even city rats will grow healthy and fit on the foods described here.

There are also special non-dairy and non-wheaten recipes for those who suffer from allergies, and there is a general trend to innovation and enthusiasm which is very catching.

Helen Stephens tried out all these recipes on her nearest and dearest, and they spring from her own experience with sometimes-bloody-minded kids. Definitely recommended.

Cooking with love — macrobiotic wholefoods for babies and young children

by Christine Hepworth

Published by Second Back Row Press rrp $4.95.

This is an interesting little book whose subject is close to my heart, having just given birth to my second child.

Although I do not follow a macrobiotic diet I found the recipes in this little book to be both interesting and tasty, although children really do have to be brought up on such a diet to take to it (my five year old protested greatly!).

Christine Hepworth is herself a mother of two children with ten years' experience in cooking and producing natural foods, and she covers the whole gamut of childhood from pregnancy and breastfeeding to toddlers and pre-schoolers, on to school children. She also gives an explanation of macrobiotic diets at the end of the book.

One reservation I have about this book is the advice not to walk around for the first week after childbirth.

This is a misleading old tale, and indeed it is very important to walk after childbirth to prevent thrombosis, and to promote general muscle tone and speedy healing of episiotomies.

Fluoride in Australia — A case to answer

by Wendy Varney

Published by Hale and Ironmonger, rrp $12.95.

Once upon a time fluoride was hailed as the great wonder chemical that would halt all our tooth decay and send us on our smiling way.

So, reticulated water was fluoridated, and doctors advised mothers in non-fluoridated areas to feed little fluoride tablets to their babies despite the label on the bottle which warned of dire consequences if the dose was at all changed.

But little by little, disenchantment set in. Sure, children's teeth were improving and there was less decay — but couldn't this be attributed to better nutrition, and better information about the causes and prevention of tooth decay?

Today there are two strong camps, for and against fluoride, and the battle is still raging. Doctors no longer prescribe fluoride tablets for babies and councils are more cautious about the levels of fluoride in their water.

Wendy Varney's book is a timely and important addition to the fluoride debate. She makes the important point that although, as a whole, Australian govern ment bodies embraced fluoridation enthusiastically, it was mostly rejected in Europe (and their children's teeth are no worse than ours).

The story of fluoridation in Australia is unfortunately a story of political and social intimidation, and has mostly benefited certain companies and industries, such as (guess who?) the toothpaste industry.

Fluoridation is not the cure for tooth decay, she says, and attempts to present it as such can lead to people not taking other preventive measures, such as watching their sugar intake.

It is essentially a passive measure taken by governments and does not allow for freedom on the part of the consumer.

Old style cream baking

by Jan South

St Arnaud, Victoria.

We are a farming family, in fact our son is a sixth generation Australian farmer. Many of the old ways and practices outlined in *Earth Garden* have been our ways for a long time, or those of our forbears many years ago.

One of my family's old ways has always been to use cream instead of butter for cooking and baking. It seems a terrible waste of time and effort to beat cream to make butter, then turn around and beat that butter back into cream to make a cake.

Many EG readers must have surplus cream from time to time, and they may like to try these recipes. People who don't milk cows may like to try them also. Real farm cream may be replaced with supermarket cream.

Our children have all grown up and left home so we no longer have a house cow. Nowadays I make these goodies when the supermarket has cream on special, thus saving money as well.

My recipes have been handed down from one generation to the next or from neighbour to neighbour.

Cream scones

This is the way that Mum made her scones.

Break an egg into a cup, fill the cup with cream, or cream and buttermilk. Mix well, and add two cups of self-raising flour. Make in the usual way.

The 1980s version goes like this. Use the one or two inches of stale cream, or outdated cream left in the bottom of the cream jar. I break an egg into the container and fill it with milk. I cut the scones into rounds using a baby food tin with the top and bottom removed. This mixture is suitable for sweet or savoury scones. I cook scones in a hot oven, usually for about 8 — 10 minutes.

Shearing is a very busy time on the farm and is done in four two hour shifts. The first run is from 7:30 to 9:30 am. Then the shearers and shed hands have lunch. The second run is from 10 to 12 with an hour for dinner. Shearing resumes at 1 pm and goes until 3 pm, then there is another lunch break before the final run for the day.

Shearing is very hard work, and the men need a lot of good food. Meals and lunches have to be served on time, all the time.

In the old days the farmer's wife fed the shearers and the shed hands, as well as her own family. She still does the job on many farms today.

It is essential to be well prepared for shearing. I find that a few cakes made beforehand which keep well are a big help with the lunches.

One of my old faithfuls is this:

Cream Fruit Cake

Cream two cups of cream with 1 &1/2 cups of sugar then add, one at a time 4 eggs, then mix in gradually 3 cups of flour sifted with:
1/2 teaspoon of carb soda
1 teaspoon of cream of tartar
1 pinch of salt (optional).
Add 1 packet of mixed fruit, and if the mixture is too stiff add some milk. Bake in a moderate oven.

Chocolate walnut cake

Substitute two tablespoons of cocoa for the same amount of flour and add chopped walnuts. Ice it with chocolate icing. This mixture is very popular in the lunch boxes.

A small amount of cream is all that's needed for a dozen **Pattie Cakes**.
1/4 cup of cream
1/4 cup of sugar
1 egg, all beaten together until thick.
Sift together:
1/2 cup of flour
1/2 teaspoon of baking powder
a pinch of salt (optional).
Add to the beaten mixture, place in pattie pans and cook in a moderate oven.

Caramel Icing is lovely on these cakes. Use equal quantities of cream and brown sugar, place in a small saucepan and simmer for 20 minutes, stirring to prevent burning. Ice the little cakes while the icing is still warm and sprinkle with chopped walnuts.

We all know that French cuisine varies from district to district in France. This happens to a lesser degree in Australia. For example, pie melon is stewed and served as a sweet in the communities which were first settled by German settlers. You would rarely find this sweet served in an area which was first settled by the Irish or the Scots. My recipes have been gleaned from families who have descended from the Cornish miners, who became selectors when the gold ran out last century.

When you think of Cornwall, you naturally thinks of Cornish pasties, so I have an excellent recipe for pastry.

Cream pastry is the nicest pastry of them all and is possibly the easiest to make.

Place some cream in a bowl, add the flour (plain or self-raising). Sift the flour into the cream, mixing well until the mixture turns into pastry. Roll the pastry in the usual way.

Apricot cream pie

9 inch cooked tart shell
Beat 1 cup of sour cream
    1 egg
    3/4 cup of sugar
Add 3 dessertspoons of self-raising flour
    1 teaspoon of vanilla
Mix until smooth.

Add two cups of drained stewed or canned apricots and pour into the tart case. Bake in a moderate oven for 15 minutes then reduce the heat and bake until the filling is set (about 50 minutes). Serve cold.

* * * * *

On cold days dumplings are a hit with all the members of the household. Have you tried this one?

Coconut dumpling

Beat 6 tablespoons of cream and 1/4 cup of sugar, then add 1 & 1/2 cups of self-raising flour. Mix to a smooth scone dough, roll out 1/2 inch thick, cut into squares and place in a large oven dish.

The syrup is made by mixing
    3 cups of boiling water
    2 large tablespoons of golden syrup
    3 tablespoons of sugar
    1 tablespoon of butter.
Pour the syrup over the dumpling mixture, sprinkle with coconut, then bake for half an hour in a moderate oven.

I can remember Sunday night's tea at grandmother's. I can still see the starched white damask cloth and napkins, the gleaming silver and the slices of lamb carved at the table by grandfather. Egg and lettuce salad served in a crystal bowl accompanied the lamb. This is how grandmother made her salad dressing.

In a teacup put 4 teaspoons of sugar and 1/4 teaspoon of mustard, mixed to a thick paste with cream. Then add vinegar until the dressing is the correct consistency.

Summer has ended, so I will include a zucchini recipe. This is my favourite way of serving this amazing vegetable.

Zuccini with mustard sauce

Wash the zucchini, slice thinly and cook in boiling water for three minutes. Drain and keep hot.

Combine 2 tablespoons of cream and 1 teaspoon of French mustard, spoon over the zucchini and serve at once.

EARTH GARDEN UNCLASSIFIEDS

GARDENING BOOKS GALORE - Every garden book you ever dreamed of. Send for list to Plant Parenthood Books, PO Box 6, Mulgoa, 2750.

BIO-DYNAMICS, an advanced organic approach to farming and gardening. For more information send name, address and 37 cent stamp to: ATEC, PO Box 110, Leura, NSW 2781.

LA MANCHA HEALTH CENTRE Wollongbar, 2480. For help with a health problem or a healthy holiday. Near Lismore, NSW. Low rates. Phone or write for brochure (066) 295138.

STEINER SCHOOL AND KINDERGARTEN situated in the beautiful Upper Yarra Valley eighty minutes from Melbourne. Low fees, enquiries to PO Box 19, Yarra Junction (059) 667342.

AUSTRALIAN SMALL FARMS HANDBOOK. New edition now available $12.95 (plus $1.50 postage). Products, information, courses, associations, book reviews, calendars. Everything you need to know about farming in Australia: from organic supplies to pony clubs, deer to nuts, and solar cells to breed societies. Order it from Second Back Row Press, PO Box 43, Leura, NSW, 2780.

CRUISING YACHT - Want to change your lifestyle? 36' fibreglass yacht set to go! $50,000; phone Marie Lockyer (059) 888832 for inspection.

HOME STONE FLOUR MILLS. Mill your own stoneground wholemeal flour for cakes and bread at home with a Retsel Little Ark Stone Flour Mill. "Endorsed by the Housewives' Association". Write for catalogue to: Retsel Distributors, PO Box 712, Dandenong, 3175, enclosing three postage stamps, or telephone (03) 795 2725. Distributor inquiries welcome.

LETS GROW GARDEN CLUB. A new correspondence club, with Glen Heyne and John Mason. BENEFITS INCLUDE . . . *Newsletter quarterly *Mail order catalogue *Exclusive plant and seed collections *Workshops, courses, tours and holidays *Special discounts - books, tools, products etc. Send $10 annual subscription to 'Lets Grow', The Garden Cottage, Malmsbury RMD Daylesford, VIC 3460.

Dear Sergeant Pepper: Happy 20th — A & C.

LAND LINES

LAND LINES are for people buying, selling, seeking or sharing houses and land. It is your resonsibility to check all deals. We charge a rate of 24 cents per word (prepaid) for a listing of any desired length — the grid on the last page can be used for preparing your ad. All LAND LINES must include your name and address (phone number is optional). LAND LINES for the August issue should be in (to PO Box 188 Moreland, 3058) by 24 July.

WE have a nice guest house with all amenities in Tenterfield in the Northern Tablelands near the Queensland border. It is ideal for people wanting a quiet holiday or to recuperate after an illness or just to recharge body and soul. The rates are very reasonable: 3 first class meals a day plus morning and afternoon teas for seven days is $100, plus — less for any consecutive weeks. Special rates and attention for aged pensioners. Vegetarians are catered for with healthy meals. We are an *Earth Garden* family: caring, and will ensure guests are well looked after. Nice drives in the area for those with cars. Train service and daily bus services. Further information from L McCabe, (prop) on (067) 361232.

ARALUEN NSW, peaceful 50 hectare retreat bordered by the Deura National Park. Temperate rainforest, mainly angophora, redgum and stringybark. Natural cleared amphitheatre, plus a couple of other clearings. Asking $30,000 for half share or possibly sell whole property for $55,000. Details please contact Ray & Santi Lodge, RMB Pidgeon Gully, Araluen, 2622 (048) 461180, or Graham Simmons, 11/100 Milson Rd, Cremorne Point, 2090 (02) 953 8449.

20 MINUTES SOUTH OF BEAUDESERT, 150 acres on two deeds for sale. 25 acres of standing softwood scrub and 25 acres of ex banana and paw paw country. 100 acres of forest. Fronts Cainbable Creek plus there is a well. Please contact Tom Ward, 34 Stanley St, Gympie, Qld, 4570 (071) 824897.

MIRIAM VALE QLD — our 15 acre farm and house are for sale. The land has been selectively cleared and has couch pastures, 2 dams, a bore and is fully fenced with three paddocks. The house, which is full brick, has 3 bedrooms and cathedral pine ceilings. Solarhart, septic, phone, Lister diesel generator and 12 volt power system. Mains power available. Double storey shed/studio. School bus service, 6 kms to primary, preschool & high school and town. 30 minutes to beach, 45 minutes to Gladstone. Suit stud/turf/nursery/kennels. $83,000 or exchange with cash for house in Sydney region. If interested phone (02) 771 5706. Dora & Dieter Jahnes, 17 Bingara Drive, Sandy Point, NSW, 2170.

EAST GIPPSLAND, VICTORIA, one bedroom house and loft on Sunrise Farm community. $45 pw suit vegetarian-s with strong interest in plants. Possibilities of selling produce in Melbourne. No cats or dogs. Large established vegie garden and numerous trees. If interested please contact Neil Hanna, Lot 172, Hazeldene Road, Gladysdale, VIC, 3797.

NEAR YANKALILLA, 75 KM SOUTH OF ADELAIDE. Are you a responsible couple, family or group (possibly a single person) looking to rent/lease a comfortable room house on 50 acres, 7 kms from the beach? Beautiful environment, workshop space. Could suit most kinds of self-employed persons, keen gardeners, permaculture potentials. Good place for most creative ventures. Large organically-worked vegie garden area. There are 30 sheep and a handful of poultry. Basic caretaking of these and some gardening required in exchange for low rent. Any extra work volunteered can offset rent. For more details write to Ruth Eisner, 6 William St, Croydon, SA, 5008, or ring (08) 465331.

LITTLE HARTLEY RETREAT 26 acres, 3 bedroom 16 square home. Double bed, stove, solar, spring and rain water, tractor, fittings, trailer, 3 horses, 2 sheds, generator and more. $98,000 (063) 552241. Please contact 'Pinecrest', 5 Niegalong Place, Little Hartley, NSW, 2790.

NORTH EAST NSW. 20 km west of Lismore. 8 shares, up to five acres each and use of Land in Common. North east aspect, mostly frost free, good water, adjacent to Bungabee State Forest. Price $10,000 includes use of four wheel drive, tractor, farm machinery and community building. We welcome families of different denominations who have a meaningful commitment that is true to God and the Bible. Dan & Debbie Bacon, Cawongla Rd, Rock Valley, NSW, 2480.

STOP PRESS: LAND LINES GOES VISUAL!

That's right folks — starting with the next issue of *Earth Garden* (EG 56, out in mid-August) we will be accepting photographs of land and/or houses. Readers have commented that it's difficult to describe a beautiful property in a classified advertisement, so from now on we'll all be able to see it as well as read about it. To have a photo published with your LAND LINE we will charge you a bit less than it costs us to produce: $10 extra. Send a print (preferably black and white, but a colour snapshot with *good* contrast will be okay) and the photo will appear across one column and about as deep as this box.

INGLEWOOD, QUEENSLAND — 550 acres freehold, creek, fully fenced mostly electric (solar), bore for stock and domestic purposes not for irrigation, 2 sheds one liveable, large dams, good timber and all-weather access. Ideal for goats or sheep. Not connected to mains power, 15 minutes to town. School bus. $50,000 ono. Please write to B Wells, PO Box 42, Inglewood, QLD, 4387.

MELROSE, NEAR WONDAI, QLD. For sale: 44 acres of formerly cultivated land, mostly cleared, some trees, power, phone available, school five minutes away, sealed roads, town facilities half hour away, ideal farmlet- $33,000. For information and VDO send blank VHS tape to Gerald and Heather Hanley, 51 Sharon Crescent, Kelso, 4815.

WEBSTERS CREEK, NIMBIN, NSW. Two shares of 10 acres in 360 property. Forrested with creek flats and some rainforest areas. Beautiful waterholes and abundant wildlife. Fully approved surveyed shares with established water system. 2 wheel-drive all weather access - privacy. Able to be moved on to immediately $13,000 negotiable. For details and photos contact Mark Taranto c/- PO Nimbin, 2480.

FAR NORTH COAST, Share for sale in Serendipity community. Share includes four bedroom home on 10 acres, large working shed, good working equipment, above ground swimming pool, greenhouse, fruit trees, 240 volt generator, phone. Ideal place for nature lover. Be surrounded by eucalypt forest, heath and national park and close to untouched beaches and river. 20 minutes to shops. Unique legal set up. Price $54,950. Please phone Rosemary Zillig (066) 218939 or write to: 46 Ubrihien St, Lismore, NSW, 2480.

MIDNORTH COAST, NSW. 25 acres of mostly littoral rainforest, adjoins Hat Head National Park, 9 kms north of Crescent Head, 1 km to beach. Two bedroom concrete brick home, slow combustion stove, solar panel, 500 gallon rainwater tank, ample borewater, electricity, phone. Suit pigs, poultry, nursery, caravan/camping park. $89,000 Kempsey. Phone N Symington, (065) 654211 or 660238.

MIDNORTH COAST, NSW, 25 acres inland from Crescent Head and only 15 minutes from Kempsey. Lightly timbered, gently sloping land. Fully fenced with creek and waterholes and dam. Elevated house sites with beautiful rural views. School bus, electricity, phone, mail all available. $30,500 ono phone (065) 669342 or write to Wade, Lot 5, Pipers Creek Road, Dondingalong, NSW, 2440.

SOUTHERN TABLELANDS, NSW: 2 & 1/2 hours from Liverpool, 1 & 1/4 from Canberra. 118 acres (subdividable) forested retreat, plus furnished weekender, three dams with fish, fruit and nut trees, vegie garden and well. Abundant wildlife, photos available — asking $55,000. Phone Jim Gauld on (02) 969 1992.

NEAR VIC-NSW BORDER. We have bush blocks from $20,000 surrounded by National Parks, State Forests, beach, lakes nearby. Nearest town is Eden. Ample water, lots of wildlife. Smallest block is 34 acres, biggest is 140 acres. Ring Nancy on (047) 841020.

NORTHERN NSW. Mountain retreat 1/7th share of 300 acres comprising large timber cabin, 12 acres fenced grassland, abundant water, very good soil, fruit trees, established vegie garden. Much of the property is heavily timbered, permanent creeks, bordered by rainforest in adjacent Mt Warning National Park. Only 15 minutes to Murwillumbah. Four wheel drive all weather access, $39,000: A Crabtree, Eungella, NSW, 2484, phone (066) 793254.

HOUSE, sheds and 30 acres in magnificent East Gippsland. $55,000 ono, phone F McIlroy (064) 580236.

MID NORTH COAST. 587 acres of mountain country 10 kilometres from Comboyne. 40% of the property is rainforest, the rest is hardwood forest with grazing. Good creeks, rainfall, soil, views, building materials and homesites. Each share includes 25 acres, the rest shared. 6 shares $12,500 each, with three left. Telephone Taree for more information on (065) 534028.

Earth Garden Land lines and classified advertisements are 24 cents per word. Please enclose the appropriate payment with your advertisement, to arrive by the middle of the month preceding the issue date.

BOOKS & ISSUES

EARTH GARDEN, PO Box 188, Moreland, Victoria, 3058

BOOKS

ENERGY WORKS! — $19.95 .... **$.**............
Third Earth Garden Book — $5.50 .... **$.**............
The Settler's Guide — $15.95 .... **$.**............
HARD TIMES HANDBOOK — $8.50 .... **$.**............

MAGAZINES

1987 Subscription — $15.00 .... **$.**............
The lot: EG1 — EG55 (excludes EG13) — $97.00 (save $60) .... **$.**............
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No need to cut this page, just send us the details in a letter if you prefer.

1987 SUBSCRIPTION

EARTH GARDEN, PO Box 188, Moreland, Victoria, 3058

Please post me the six issues EG 56 to EG 61 (August '87 to June '88).

I enclose:
☐ **$15.00** ☐ **Two year subscription — $31.00** ☐ **Three year subscription — $48.00**
Name ....
Address ....
.... **Postcode.**..........

Back copies

EG1: Move out . . . food co-ops . . . Kibbutz and Moshav . . . Montsalvat . . . herbs . . . Fred Robinson . . . bean sprouts . . . compost and mulch . . . comfrey . . . earthworms.

EG2: Start a garden . . . Neil Douglas . . . Keyline system . . . Kiewa farms . . . drying and storing food . . . hydroponics . . . recycling garbage . . . nutrition.

EG3: Herbs . . . compost . . . fast fertiliser . . . all about goats . . . mudbricks . . . domes . . . water wheel . . . bread . . . salads . . . pottery . . . spinning . . . vegies.

EG4: The honey bee . . . back to the land in Tassie . . . the transition . . . black sheep . . . tanning . . . candles . . . bread . . . donkeys . . . a wall-hanging.

EG5: The wind — windmills . . . windpumps . . . generators . . . raku pottery . . . Cinva ram . . . poultry . . . Hamburghs . . . moon planting . . . fallout shelter . . . vegan way.

EG6: Solar 1 — sun cults . . . solar cooker . . . sundials . . . Lost World . . . Clifton Pugh . . . concrete house . . . Shalom . . . Cajun cookin' . . . horses . . . spirit of Nimbin.

EG7: Solar 2 — hot water . . . Mudbrick techniques . . . Angora goats . . . make a leather bag and belt . . . mushrooms . . . natural dyes.

EG8: Gas power — methane digester . . . by truck to Tassie . . . cumbungi hats . . . inkle loom . . . candles and tapers . . . country cottages . . . A-frame . . . school gardens . . . sourdough.

EG9: LP gas . . . Mary's place . . . building with stone rubble (slipform) . . . macrobiotics . . . oats . . . ducks . . . rug frame . . . how to kill a pig.

EG10: Granite house . . . geese . . . chip heater . . . bamboo flutes . . . build beehives . . . Jarrah shingles . . . mudbricks . . . Bio-dynamics . . . seaweed . . . tandem . . . Index (EG1-10).

EG11: Water — hydraulic ram . . . waterwheels . . . okra . . . seed primer . . . heavy horses . . . tomatoes . . . soft technology . . . wine . . . hard cheese . . . start with hens.

EG12: Keeping food — drying . . . salting . . . bottling . . . storing . . . tahu . . . tropic delights . . . plant propagation . . . plans for a solar water heater . . . solar stills and cooker . . . Moora Moora.

EG13: OUT OF PRINT.

EG14: Self-sufficiency — gardens for all . . . Botobolar vineyard . . . Terania Creek . . . millet . . . Robinson Crusoe . . . Walden . . . The Nearings . . . stone building.

EG15: A Lytel Herbal — growing and using herbs . . . text and illustrations from the classic 16th C herbals . . . modern commentary . . . Index to EG15.

EG16: A Lytel Herbal (Part 2) — comfrey, lavender, wormwood, yarrow . . . poultry shed . . . peafowl . . . goats . . . basic beekeeping . . . rammed earth building . . . hydraulic ram.

EG17: Fencing . . . dry stone walls . . . make soap . . . nets . . . pole shelter . . . breeding black sheep . . . The Autonomous House . . . asparagus . . . Aeolian harp . . . ducks . . . Khaki Campbells.

EG18: Fruit garden . . . oranges . . . lemons . . . olives . . . nuts . . . tropical fruit . . . fodder trees . . . road building . . . wood fired kiln plans . . . Cinva-ram cottage . . . sunflowers . . . homebirth.

EG19: Wood heat — pot bellies . . . Jotul . . . cooking . . . making a quid . . . build a storage cellar . . . bushfires . . . stonefruit . . . macadamia nuts . . . binding your EGs . . . tree planting . . . budding.

EG20: Apples . . . pears . . . cordon and espalier . . . build a haybale pig house . . . pollen . . . rose hips . . . mudbrick flats . . . solar homes . . . gourds . . . preserve fence posts.

EG21: Womancraft — all articles by women . . . earthly arts . . . axewomanship . . . glove puppets . . . spinning . . . weaving . . . easy rugs . . . Sumatran house . . . old roses . . . Index (EG10-20).

EG22-23: Australian Access Sourcebook . . . 150 pages . . . Aborigines . . . organic growing . . . permaculture . . . earth building . . . wind . . . solar . . . water power . . . technology . . . water supply . . . access to groups, plans, books, tools.

EG24: Place — 24 new settlers write . . . Mare Carter . . . Ron Edwards . . . Neil Douglas . . . Gundaroo Store . . . Rainbow Region . . . Mt Oak . . . Moora Moora . . . Universal Brotherhood . . . bush ashram.

EG25: Australian Access Sourcebook (Part 2) — 130 pages . . . livestock . . . aquaculture . . . fencing . . . killing . . . tanning . . . food and nutrition . . . grain grinders . . . solar homes . . . methane . . . greenhouse . . . Dorothy Hall.

EG26: The earth-built kasbahs . . . owner built homes in stone . . . timber . . . mudbricks . . . a slab cottage . . . tree felling . . . solar electrics . . . acorns . . . compost dunny . . . quandong . . . pumpkin recipes.

EG27: 100 tropical food plants for Australia (part 1) . . . 16 legumes . . . winged bean . . . pigeon pea . . . lablab . . . cowpea . . . adzuki bean . . . blacksmithing . . . bluestone building . . . wok cooking.

EG28: Tropical food plants (part 2) . . . horse and buggy . . . packhorsing the Alps . . . black sheep . . . Merinos . . . bullocks . . . tamarillo . . . stringybark baskets . . . solar trike . . . persimmons.

BACK ISSUE LIBRARY

All the back copies, from 1972 to 1986 (EG1 to EG52, except EG13). A survival kit of self-reliance, the 'big packet' (5 kg) has 3,100 pages of practical information on growing, building, energy, household economy, livestock, craft and tucker and tales from New Settlers all around Australia.

EG29: Mudbricks — the monastery at Stroud . . . Bob's bonza brickmaker . . . earth floors . . . curved walls . . . herb roof . . . cutting axe . . . low energy design . . . coconut mats . . . mangoes . . . tropical food plants (part 3).

EG30: Organic growing — compost heaps, pits, trenches, boxes, bins and barrels . . . no-dig . . . mulch carpets . . . semi-arid growing . . . preserving figs . . . tempeh . . . pasta . . . glass bottle windows.

EG31: Energy — make a hydraulic ram . . . second-hand windpump . . . mudbrick sequels . . . freezing food . . . zucchini glut . . . drying fruit . . . all about sprouts . . . hot box cooker . . . building a log house (part 1).

EG32: Year of the Tree — St Barbe Baker . . . tree tales . . . how a tree works . . . farm tree . . . native from seed . . . coppicing . . . Neil Douglas interview . . . cob building . . . log house (part 2).

EG33: Tenth anniversary issue . . . timber felling . . . lifting poles . . . post and beam design . . . log house (part 3) . . . parquet floors . . . backyard rabbits . . . goats . . . fowls . . . dry pit loo . . . portable henhouse.

EG34: China — communes . . . trees . . . fish farming . . . recycling human wastes . . . biogas . . . transport . . . travel notes . . . Chinese earth building (Ron Edwards) . . . rainforest . . . bread and jam.

EG35: Bees and trees — tribute to St Barbe Baker . . . backyard bees . . . mudbrick workshop . . . footings for earth walls . . . make a solar collector . . . magpies . . . earthworms . . . fodder trees.

EG36: Retrn to Nimbin . . . new settlers . . . a woman builder . . . pawpaw plantation . . . solar electric systems . . . potty garden . . . choughs . . . Peru . . . lavender sachet . . . biological building . . . farm structures.

EG37: HARD TIMES . . . making paper . . . newspaper fuel . . . rags to rugs . . . barter . . . slush lamps . . . sawdust stoves . . . Depression dodges . . . hand grain mills . . . 120 household hints.

EG38: Hard Times tucker . . . bread . . . soups . . . yoghurt . . . no-meat meals . . . beer . . . electric grain grinders . . . Gujarati village . . . mudbrick hermitage . . . earth walls and bushfires . . . Noel's island.

EG39: Build Peter Pedal's bike wheel wind generator . . . fire without matches . . . bushfire defensive house . . . avocado growing guide . . . rosehips . . . car battery power . . . farm energy . . . backyard food.

EG40: Communities . . . running a food co-op . . . three in a caravan . . . Scott Nearing's a good life . . . cyder in Tasmania . . . our self-built house . . . earth floors . . . the billy . . . olive oil . . . hares . . . cashew nuts.

EG41: Sahara . . . Timbuktu . . . Uganda . . . pack donkeys . . . horse float journey . . . mat-tents . . . build a S-rotor wind generator . . . damper . . . yeastless bread . . . food co-op accounts . . . real potatoes. . . Index, EG31-40.

EG42: Earth covered homes . . . Burra dugouts . . . slipform stone . . . the flood-defensive house . . . tomato tips . . . deep ecology . . . build a pigsty . . . EG reader survey . . . the Tuareg . . . Jean Pain's methods.

EG43: Earth domes and vaults . . . rendering earth walls . . . quarry bush stone . . . bush shower . . . Peter Pedals' incinerator hot water and Pelton wheel . . . low voltage wiring . . . sheep . . . donkeys . . . horses.

EG44: Plug in the sun — solar electric systems . . . 12V to 240V . . . batteries . . . inverters . . . alternative washdays . . . how to make a pedal drier and 12V computers . . . solar panel booster . . . Solar Trek.

EG45: Waterworks — shifting water with sun, wind and water . . . solar electric pumps . . . gravity feed . . . hydraulic ram . . . Platapump . . . the cyclone-defensive house . . . bunya nuts . . . 12 V problems.

EG46: Windworks — wind generators . . . solar trackers . . . water turbines . . . 12 V bilge pump . . . herbal shampoo . . . compost loos . . . Tanzania . . . the algae pond . . . 12 V lights . . . Krypton lamps.

EG47: Practical projects . . . hanging a door . . . household plumbing . . . waterwheel pump . . . cycling Mongolia . . . the sun-pump . . . livestock . . . Aussie yurt . . . pigeon pea . . . bee tools . . . Peter's pedal machine.

EG48: Bob Rich's rammed earth primer . . . 1930s Dab, Pug and Pise, compost muncher . . . sushi and sashimi . . . Energy Pulse . . . buying an energy system . . . animal shelters . . . hand dug wells . . . ferrocement tank . . . growing firewood.

EG49: Chlorella culture . . . Solar Pack . . . Peter Pedals' TARDIS . . . just 6 volts . . . Poll Herefords . . . Babaco . . . Genteel frugality . . . Evening Primrose . . . home-made ladders . . . ferrocement roofs . . . building blues . . . immersion heaters . . . HARD TIMES hints . . . Soper with Chaucer.

EG50: Land ethics . . . Sustainable agriculture . . . Biodynamic, Keyline, Organic, Permaculture methods . . . healthy sweets . . . bamboo ladder . . . happy gardening . . . homegrown spuds . . . stone & mudbrick arches . . . Earthbricks . . . ferrocement tank . . . poultry pyramids . . . Energy Pulse.

EG51: Australian solar kit homes . . . self-sufficient house . . . solarium . . . energy updates . . . thin film solar panels . . . ram & sun pumps . . . two-faced stonework . . . river stone & mudbrick . . . earth building access . . . kero refrigeration . . . a shunt regulator . . . vegie basics . . . corn is king . . . 3-ply spinning . . . loo review .

EG52: Simple solar electric systems . . . 12 V fridge . . . 12V record player . . . EG interviews . . . composting with earth-worms, glazing skills, mudbrick pictures.

EG 53: Horse drawn gypey holidays . . . solar refrigeration . . . cottage gardens. . . organic scale control . . . Do-it-yourself land transfer . . .bartering . . . chaff cutters .

In our last issue

EG54: 12V solar lighting and appliances . . . tomatoes . . . chick brooder . . . inverters for 240V appliances for solar systems . . . boring for water . . . festivals.

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